UNDERCURRENTS

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14

NO MORE WORK FOR WORK'S SAKE

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Network for Alternative Technology and Technology Assessment

NATTA

The Open University is sponsoring a two day conference, to be held at Cranfield Institute of Technology, on April 3 and 4th 1976, which will look at a variety of strategies and programmes for social change involving technology. The aim is to discuss the potential, drawbacks and political implications of a number of radical programmes of social action including environmental lobbying, technology assessments performed by and/or for community and consumer groups, alternative technology and community technology development, industrial health and safety campaigns and trade union initiatives in the field of pollution and alternative technology.

The weekend will consist of workshop and plenary sessions through which activists can exchange experiences and explore the relationship of various types of strategy to the ongoing process of social, technical and political change. It is hoped to publish an account of the proceedings in future issues of Undercurrents. Attendance will be limited to around 60 people to make group discussion easier; bookings will be allocated on a first come first served basis: the closing date is March 15. Dinner, overnight accommodation and breakfast cost £6, lunches on Saturday and Sunday £1 each. Cranfield is near Bedford and Bletchley Stations and junctions 13 and 14 on the M1. We hope to provide some transport from these stations.

Please contact Dave Elliott, Faculty of Technology, Open University, Walton, Milton Keynes, Bucks for further details and a booking form.

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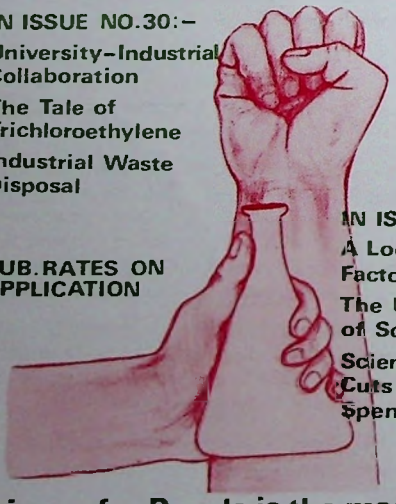

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DEADLINES. *Undercurrents* 15 will be published on April 1st. Features, Reviews and Display Advertisements should be in our hands by March 1st. Eddies and Small Ads copy deadline is March 20th.

CREDITS. *Undercurrents* is produced by a large number of people. There are only two paid staff, one full time, one part time. The rest of us work for nothing in our spare time. Here, in alphabetical order, are the names of the people most directly concerned in putting the magazine together.

Godfrey Boyle, Sally Boyle, Duncan Campbell, Peter Cockerton, Pat Coyne, Tony Durham, Dave Elliott, Richard Elen, Sotires Eleftheriou, Herbie Girardet, Peter Harper, Chris Hutton-Squire, Martin Ince, Barbara Kern, Martyn Partridge, and Peter Sommer. Other people without whom *Undercurrents* would be more-or-less impossible include: Graham Andrews, Gavin Browning, Ollie Caldecott, Charlie Clutterbuck, Brian Ford, Ian Hogan, Roger Hall, Cliff Harper, John Prudhoe, Dieter Pevsner, Nigel Thomas, Geoff Watts, Martyn Turner, Joy Watt and Woody. And of course everyone we've forgotten.

HELPERS: If you're interested in helping on *Undercurrents* in any way write or phone for details of our weekly meetings.

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February-March 1976

eddies

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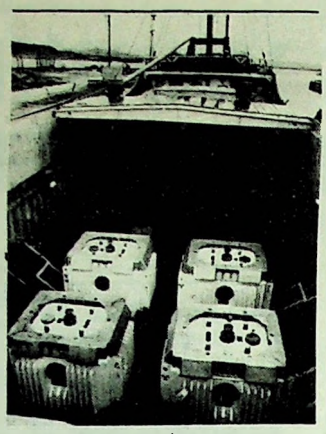

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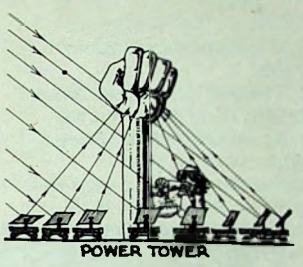

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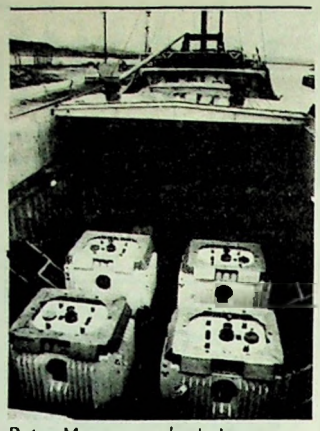

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BENNERGY PROPAGANDA

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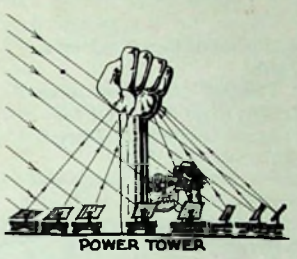

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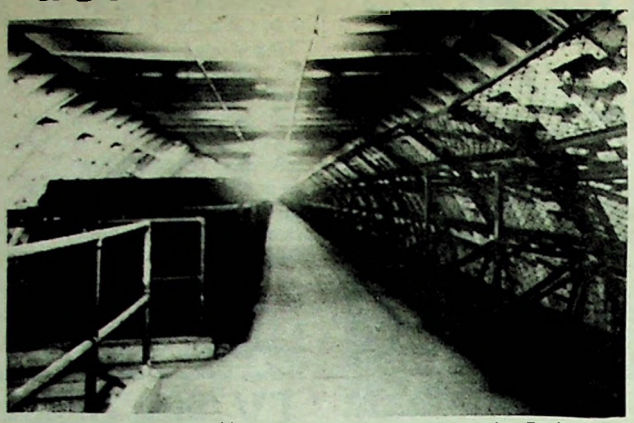
Crashpads down under

Seven enormous deep tunnel shelters are now up for lease by the Department of the Environment. All seven, scattered across London from Belsize Park to Clapham Common, were built during the second world war, and have been immaculately maintained since then.

The Home Office's disposal of the tunnels will upset bunker enthusiasts grand join-the-dots underground diagrams of London (see UC 9), for in thirty years the sets of twin quarter mile long tunnels have been used for nothing more exciting than storage of passport records and crashpads for passing troops. The only exception is the eighth tunnel under Chancery Lane, containing the Post Office's deviously misnamed Kingsway exchange.

Undercurrents recently took a trip round two shelters in north London, to sample the joys of life 110 feet down.



Thirty feet below the Northern Line station at Belsize Park, the bunks go on for miles

All are still equipped with rows of bunks – 6000 a time – many of which conveniently fold away during the day. The shelters have each two side-by-side tunnels, two floors in each tunnel. It is impossible to see one end of the tunnel from the other, as the scene fades in a perspective of converging bunks and rows of incandescent lights.

The DoE are serious about leasing them off – but the range of uses for the tunnels, with only two slow three-person lifts at each end, must be limited. An Irish peat importer is reported to have taken an interest.

But the most obvious use, if possible, would be to sleep people. With electrical and ventilation equipment in good order, a little imagination (and cash) could create an entirely unique hostel or crashpad for summer visitors to London, deep beneath the city streets.

The prospects of a cheap bunker may well be good. When the DoE recently sold two much more accessible underground ammunition depots near Bath, they only obtained a tenth of the hoped-for £1M.

Emergency planning

Several readers have criticised recent coverage in UC of civil defence topics. Why talk about it, one letter asked. If the secrets of civil defence were laid bare would this not frustrate the common interest by inciting panic, and defeating the purpose of CD?

In fact, we intend to look at CD and emergency planning from a new angle in future. There are a wide range of non-governmental voluntary groups, whose declared purpose is to provide aid in the event of any kind of disaster. Many of the groups are the residue of the Civil Defence Corps disbanded in 1968.

These groups range from the Dunkirk mentality of some so-called private armies (such as General Walker's Civil Assistance) to the highly effective civil Aid unit run by Bath Arts Workshop, which has provided catering services at Comtek and many pop festivals. Most groups of the latter kind come together in the Civil Aid organisation, with a homespun philosophy of helpfulness.

Which sets them apart from the planning of central government, whose sole object is the preservation of the state. This is not philosophical – the main intent of planning by the Home Office and some of local authority Emergency Planning officers, especially in the rural areas, is to ensure that they will be in control after any nuclear attack or other disaster.

Home Defence planning (as it's now called) is secret precisely because it is planning for a situation where the interests of the state differ sharply from those whom they are 'defending'. Many people seem interested to find out just what is going on, which is why we write about it.

TV Ecoshow Starts

The 20 programme long TV series on Granada's semi-autonomous house commenced at the start of January. (see 'Ecohouse'; *Undercurrents* 12 and 13). After being ineptly and meaninglessly retitled 'A House for the Future' by ITV programme planners, insult has been added to injury by the hopeless screening time that most ITV companies have given it. With one notable exception, all the network companies are showing it between 11 am and 2 pm on Sunday mornings, while most of the country sleeps. (Tyne-Tees is the exception; 11 pm).

For anyone with an interest in alternative technologies and a practical approach to alternative lifestyles, the Ecohouse show is almost compulsory viewing. It is *not* an alternative Barry Bucknell *do-it-yourself*, although the *DIY influence* is strong.

It is well worth watching, firstly for the whistlestop tour of many of the most interesting projects in alternative living in and around Street Farmers to isolated autonomous farming communities. Most of the rest of the time is taken discussing and demonstrating the specific energy gathering and saving techniques used in the house.

When visited by *Undercurrents* early in December the converted coachhouse near Macclesfield was beginning to take shape as the Ecohouse. The BRAD-type solar roof was in place, after some difficulties, and wooden cladding covered all but one wall. Foundations for the lean-to greenhouse were being dug. It will be something of a race to get the house finished in time

Producer Brian Trueman with the Ecohouse

By then the Grant family, who will occupy the house, should have moved in to put the house to the test. The problems of time-scale mean that more of the construction work may have to be done by builders and students who have been assisting Geoff Grant and the series producer and presenter Brian Trueman.

It is disappointing that so few people are likely to see the series. Its inept title and the poor 'slot' allocated to it mean that few of the uninitiated are likely to come across it – or realise its existence. A pity, because the broad and practical approach could draw more than passing interest from many people.

But for the rest of us, it seems doubtful that the AT movement could have gotten more honest or better publicists.

Topics for future programmes in the series:

February—Sunpower; Solar Roofs; Windpower designs; Practical wind design

March—Energy Storage; Heat Pumps; Ventilation; Lighting, Plumbing, and Waste

April—Test of systems, and opening of Ecohouse.

Another TV programme worthy of watching, mostly for its footage of Comtek 75 and Street Farm, is 'What on Earth have we done' produced by the BBC's Bristol unit. This was shown las autumn, but a repeat is possible, particularly if requested. Write to: *Director of Television, BBC Television Centre, London W12.*

FROTH

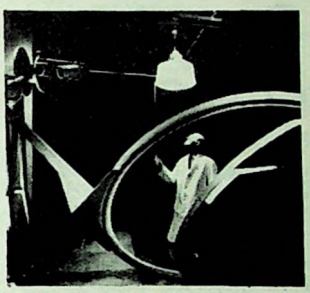
NEW EARTHS FOR OLD

This spring, about May, should see the publication of another of the rapidly growing range of publications concerned with AT, self-sufficiency, etc. *New Earth Times* will be printed in trendy Todmorden (near Hebden Bridge and Rochdale) by Aarox publishing jointly with a group in Massachusetts, USA.

Rod Fielding, one of Aarox principal workers, sees New Earth Times as a cross between Mother Earth News and the Whole Earth Catalogue - but without the 'terrible corniness' of MEN, on which he used to work. New Earth Times will come out quarterly, £1.00 for a large paperback covering crafts, self-sufficiency, farming and growing, technologies, etc. And the style will often be akin to the Whole Earth Catalogue, especially in planned catalogue supplements.

Rod says that many people have already signed up for subscriptions in advance.

Undercurrents can now confirm rumours that the Welsh Nasty Centre for Alternative Technology (NCAT) has started work on the first Army contract for low energy solar weapons. Commandant of solar focussing site Gerbil Movin – Gerbil is seen here with prototype equipment.



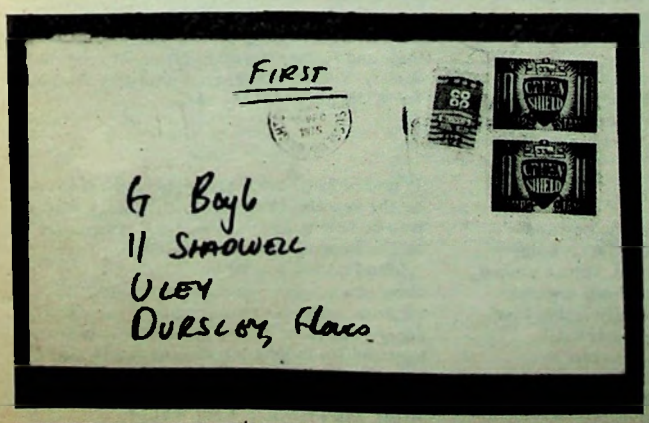
SUNDAY UNDERCURRENTS INFLATION TIP

The Post Office has been changing the postage rates so fast that it's questionable how well the automatic equipment which scrutinises stamps can operate effectively. It should identify phosphor lines which glow under UV light.

The equipment, apparently, doesn't work well at all. As witness several curious postal packets dispatched to UC. All arrived without comment, whether unstamped, under-stamped or – wait for it – adorned in Green Shield stamps.

Green Shield stamps have been working quite well for two years now, according to some reports. Start saving now, buy your stamps from the grocer.

Below: 20 Green Shield and one Co-op stamp used for letter mail



round Britain

For some time, Undercurrents has hoped to cover developments and projects under way round Britain (and occasionally elsewhere). The first fruits of this have appeared partly as a result of the tentative regional network of correspondents (see below). Please write to Undercurrents about projects or plans if you want to get something under way.

In the **MIDLANDS**, two alternative technology groups have been formed since last summer. By December, one, the East Midlands AT group (EMAT), had distributed resource lists and started looking for premises in **NOTTINGHAM**. They've also built or are in the course of building a variety of working projects, including shit digesters and a Savonius rotor. A bicycle workshop is the first plan when premises are found. To get in touch with EMAT to join, offer resources or ideas, etc., contact:

Jan Bang or Dave Wilde, Grange Farm Cottage, OXTEN, Notts, (Mansfield 882001)

Around **BIRMINGHAM**, a similar but smaller group has been organised. Contact West Midlands AT group through:

Peoples Centre, 761 Bristol Avenue, Selly Oak, Birmingham

In KENT, Ken Smith, an electronics lecturer at the university at **CANTERBURY**, is keen to organise or assist forming a group concerned with radical technologies or educational projects. A particularly likely project could be a skills and tools exchange. Perhaps most useful, Ken has a farmhouse available for meetings to be held or work to be done. Contact:

Ken Smith, Staple Farmhouse, Staple, CANTERBURY, Kent (Ash 812723

Finally, the regional network of correspondents. All the people on the list below have offered to report interesting events in their areas, on their initiative or if others contact them. If you know of an interesting event, get in touch:

CORNWALL – Jon Campbell, Lucastes, Lerryn, Lostwithiel, Cornwall.
GLOUCESTER – Godfrey Boyle, 11 Shadwell, Uley, Dursley, Gloucs. (Uley 636).
SOMERSET – Mike Law, Chapel House, Lynchcombe Lane, Perch Hill, Westbury-sub-Mendip, Wells, Somerset. (Priddy 502).
POWYS – Bob Todd (NCAT), Llwyngwern Quarry, Machynlleth, Powys. (Machynlleth 2400).
CARDIFF – Paul Downton, 139 Wyverne Road, Cathays. (Cardiff 43485)
BUCKS – Kip Handling, Signal Cottage, Bledlow, Bucks.
SUSSEX – Duncan Campbell, 31 Franklin Road, Brighton, Sussex. (Brighton 686822).
ESSEX – Jan Wysocki, Hams Cottage, Back Road, Kirton, Ipswich.
YORKS – Leeds Future Studies Centre, 15 Kelso Road, Leeds 2.
LANCS – Nigel Ferguson, Brentwood End Cottage, Lower Bentham, Lancaster, Lancs.
NORTHUMBERLAND – Geoff Watson, Church Cottage, Chollerton, Hexham. Monica Frisch, EGIS Information Service, North Lodge, Elswick Road Cemetry, Newcastle 4.
EDINBURGH – Michael Tribbeck, 10 Cannon Lane, Edinburgh 10. (031-447 4908).

THE LOCAL FOE group are at the fore of environmental action in Cardiff at the present time. Their attitude to the use of AT appears to be very positive. Amongst other things, they are in the throes of trying to obtain "a house to convert to an eco-house, to be run as an 'environmental commune'"; and an exhibition on energy and AT is planned for the New Year. Anyone in the Cardiff area wanting to learn more should write to: John Drysdale, 2 Manor Street, Cardiff.

STOP PRESS

SINCE THE articles on the BRAD community (page 37) went to press, Philip and Johanne Brachi have decided to leave the community.

"We're still very much hoping that BRAD will survive and evolve in its own direction", says Philip.

"Four good folk remain here, and the ads for more are appearing now.

"Our move is not any rejection of them, or of BRAD, AT, or Communal Living – all of which I defend and espouse – but it seems to us to be time for a change. Maybe I could explain in the pages of *Undercurrents* one day . . . . .?"

eddies

Free phone charge

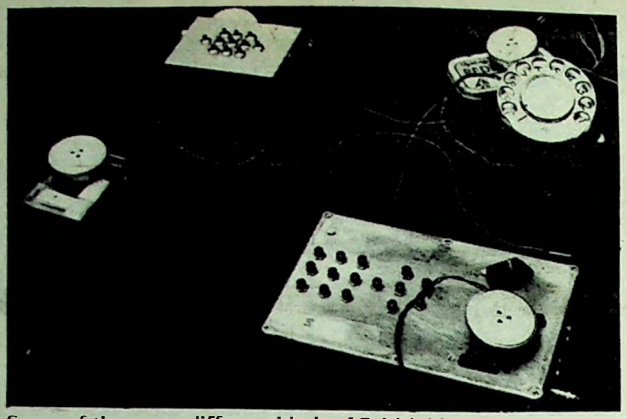
Britain's phone phreaks are still being pursued by Post Office sleuths. In January this year, a London telephone operator was accused of using both a bleeper, or blue box, and a mute or black box, to avoid charging on incoming and outgoing calls from his south London telephone number.

The bleeper works by simulating the Post Office's long distance trunk signalling system known as AC9. With such a box, a phreak can remotely control trunk exchanges equipment and thus dial over the long distance network. The Post Office seized an AC9 bleeper from the operator, and found it identical to five others they already possessed. This type of bleeper is believed to be in limited production, and is of a neat standardised design (see picture).

Although the bleeper can be used to dial directly all over the country, the operator, Norman Melrose, had mainly made calls to the North of England.

The 'mute', also known as black box, is a device which can be fitted to any phone, and prevents calls to that phone from being charged. It allows the phone to be picked up without the exchange realising that the call has been answered. A mute had also been used in this case.

The Post Office won their case, and made off with



Some of the many different kinds of British bleeper. The AC9 bleeper, top left, is the device in production. The large box, bottom right, is a more sophisticated multifrequency type.

bleepers, mute and notes on telephone codes and how the system works. But new loopholes are opening up in the telephone system all the time. The phreaks are usually a step or two ahead, although the Post Office now has a specialist team equipped with special recorders which detect and record both AC9 and multifrequency signalling codes.

With 14 million telephones to hide behind, though, phreaks are usually fairly safe unless their telephonic games are too far out. One recent investigation was reportedly triggered by the discovery of international calls from London travelling round the world via a large West German international exchange — something both exchanges were programmed to forbid.

Swedish Eco-show

A large exhibition of alternative technology hardware and ideas is being staged in Stockholm this summer by a group called ARARAT — short for Alternative Research in Architecture, Resources, Art and Technology.

The exhibition will be staged in Stockholm's Modern Museum, between April 1 and June 10. Among the hardware on display outside in the Museum's front yard will be a two-storey solar house with space and water heating, a 'greenhouse with plants', a structure built of recycled materials, a high-masted windmill, sun and wind sculptures, and various devices which visitors will be encouraged to try.

Inside, one of the Museum's galleries will depict the faults of contemporary Western industrial society — global resource and population problems, alienation, overproduction, advertising violence and so on. But the main tone of the exhibition will be positive: it will concentrate on those changes which are not only necessary but desirable. The central feature will be a large-scale depiction of a future ecological society. This 'construct' will be framed by the four elements — Earth, Sun, Wind and Water, each on one of the four walls. Visitors moving round the exhibition will be able to follow such cycles as cultivation/household/refuse, or energy/power/industry.

The idea, say the organisers, is to "stimulate reflection and continued discussion which can be pursued further through the literature and seminars. Practical details and technical inventions are not, however, the central concern. The exhibition strives to provide impulses, ideas and visions for social imagination and political consciousness."

Contact: ARARAT, Skeppshomen, Fack, S111 49 Stockholm, Sweden (Phone 20 40 43).

WHAT'S ON...

The Architectural Association, 36 Bedford Square, London W1, is holding a series of symposiums on aspects of Solar Energy on Monday afternoons, 2-6 pm, February 2nd, *Windows as Solar Collectors*; February 9th, *Flat-plate Collectors*; February 16th, *Solar Houses*. Further details from Kevin McCartney at the AA, 01-636 0974.

The NE Surrey College of Technology (formerly Ewell) is holding a one-day conference on Organic Gardening on February 20th, 9.30 am - 6.00 pm, sponsored by the Henry Doubleday Research Association. Topics include compost, green-manuring and fertility building, the living soil, and non-chemical methods of pest and disease control. Speakers include Lawrence D. Hills, Alan Gear and A. Deavin and there will be plenty of time for discussion and questions. Further details from H.D.R.A., Convent Lane, Bocking, Braintree,

Newcastle on Tyne University is the venue for the **Appropriate Technology for the UK**, March 30-April 1. It is organised by the staff of the Faculty of Applied Science, and supported by ITDG.

The keynote speakers will be E.F. Schumacher (PhD, CBE) and among the many people presenting papers will be Roland Chaplain on 'Industry, the Community and Alternative Technology' and John Shore talking on 'Energy Conservation Research Centre: Recent Work'.

More details from the conference secretary, C.B. Marsh, Dept. of Civil Engineering, University of Newcastle on Tyne, Newcastle on Tyne NE1 7RU. Tel. 0632 28511, ext. 2419 or 2423.

Network for Alternative Technology and Technology Assessment (NATTA) is holding a two-day workshop at the OU, Milton Keynes, April 3-4. This is aimed at bringing together groups involved with community technology development, AT, grass roots industrial struggles, technology assessment etc. to exchange experience and compare strategies. Contact Dave Elliott via Undercurrents. [Ad. elsewhere in this issue].

The Alternative Society has weekend conferences, 'Towards a Political Alternative' on February 20-22 at Prinknash Old Abbey, near Gloucester, and 'Making Space to Live In' on March 5-7. Present at this workshop will be Peter Stead and Robert Clayton, partners in Alternative Building Design Group, and discussion will centre around the ways in which people might take an active part in the planning, design and construction of private and community living spaces. More details of these and further workshops from Alternative Society, 9 Morton Avenue, Kidlington, Oxford. Tel. Kidlington (08675) 3413.

February 25-27 are the dates for a conference on the **Peaceful Uses of Unusual Energy** which is to be held in San Francisco and is organised by the Research Division of LIGHT.

John Prudhoe will be there as a co-organiser and there will be discussions on Kirlian Photography, Pyramid energy, Air force Bio-energetics, Parapsychology and Psychophysics, Orgone and things like that. The conference convenor is Richard McGrath, director of LIGHT, 308 Sanchez Street, San Francisco, Calif. 94114.

RED BISHOP NO HYPOCRITE?

My firm acts for the Bishop of Southwark whose attention has been drawn to the article entitled 'Red Bishop's Move' on page 3 of the 13th issue of your magazine.

I think you have missed the whole point of what happened in respect of Dartmouth House.

This house belongs to the Diocese and is a retreat house for the Diocese and for all groups within the Diocese, or even outside it, who would like to use it.

The attention of the Bishop's Council was drawn to the fact that people using the house were not entitled to have ordinary food served to them and that no warning of this was issued when bookings were made.

The Bishop's Council therefore decided that: (a) Meat or fish should be provided in the customary way at Dartmouth House for those who wish it – as happens at the other Diocesan house; and (b) That persons or parties making application to Dartmouth House should be explicitly told that there is a choice between a non-meat and a non-fish menu and a meat and a fish menu. The Council went on to say it must be for those visiting Dartmouth House to make the decision, and not for the Community who were using Dartmouth House.

Had Dartmouth House belonged to the Community, or been let to the Community for its own purposes then the Bishop's Council would not have chosen to have intervened. In fact the Community were running the Diocesan Retreat House on behalf of the Diocese and the Bishop's Council were fully entitled to make its own terms.

It is quite wrong to attribute this to a personal whim of the Bishops. It was a matter in which the Bishop and his Council, which comprises 13 lay people and 13 clergymen were entirely in agreement and I would be grateful if you would make this clear in the next edition of your magazine.

D.W. Faull

Lee Bolton & Lee,
1 The Sanctuary,
London SW1

It is of course Mr. Faull who has missed the point. The issue was not one of protein, but of power. Beginning Now was a two year project (not a community) set up with the consent of the Council for Mission, the governors of Dartmouth House (the Bishop's Council was not concerned). They were only using the house not running it. None of the guests objected to the lack of 'ordinary food' (sic).

The only person to object was the Bishop. But because he is the boss he has had his way. He has angrily refused to listen to Beginning Now's explanation of what they were doing. He even threatened to put his lawyers on to them if they dared to write to the Times about it. 'Personal whim' seems a mild expression for such a vulgar display of authority. No wonder he feels at home among the tyrannies of the Soviet bloc.

This letter has cost someone (whom?) up to £20. How lucky this self-styled socialist is to wear the purple of a prince of the church of the properties classes! Suggestions as to how the money might have been better spent on a postcard please to Mervyn Stockwood c/o his lawyers at the address above.

GROW-IT-YOURSELF . . . .

Release is preparing a report-cum-manual on the growing and cultivation of cannabis in the British Isles. A number of handbooks are available at the moment, but they are primarily American in origin. Nothing has been published that deals specifically with the vagaries of the British climate and terrain.

Release would like to hear from anybody who has successfully grown dope in Britain with details of methods, quality etc. All communications will be treated in the strictest confidence.

Roger Lewis

Release,
1 Elgin Avenue
London W9 3PR

START DOING IT!

I was interested to note at the Bradford conference on Industry, the Community and AT that a local government employee was attacked by members of the Undercurrents collective. It appeared he was attacked simply because he was working for a large bureaucratic organisation.

The Undercurrents collective's members work for equally bureaucratic organisations, are paid equally large salaries and are also exploiting people beneath them in their hierarchies. Undercurrents! It is just not enough to work together as a collective for the magazine – it has to extend to your places of work as well.

Radical thoughts mean very little without action. The Undercurrents collective, along with the Lucas workers and the rest of us, will have to begin to change places of work – from hierarchies, which are dead and do not work to co-operatives. It is perhaps only then that we will be able to move forward to an alternative society.

Fiona Cantell

62 Tyrwhitt Road
London SE4

Your conclusion is right, Fiona, but your facts are wrong. The people who publicly criticised the Local Government bureaucrat at Bradford were friends of ours but were not members of the Undercurrents collective. Their criticism, however, was quite justified. It was was not made because the bureaucrat worked for a large local government organisation, but because he had arrogantly and persistently dismissed the views of the other members of his Commission as naive and unworthy of consideration.

By no means all of the Undercurrents collective members work for large bureaucracies. Those who do naturally do not condone the exploitation practised by their employers, and try to counter it where possible. But of course we all agree with you on the need to transform our work places from dead hierarchies into living co-operatives.

. . . OR DISTIL-IT-YOURSELF?

Why are you only running articles on 'new' drugs and other pleasurable substances? Are you ignorant of the arts that those to the North and East of us have taken centuries to perfect? Or simply too snooty to recognise the pleasures of a wee dram simply because our fathers did it first?

I refer of course to the ancient art of distilling. Although I have studied many books on home brewing I can find none which tells me (a) how to distil a strong alcohol without about 10 re-distillations, or (b) how to distil without going up with a bang or (c) how to distil ethyl alcohol instead of methyl or (d) how to test whether the distillate is safe to use.

J. Walker

Vat 69
100 Pipers Street
Seagram

HOUSE FOR THE FUTURE

Some comments on your two pieces about our *House for the Future* series (*Undercurrents* 12 and 13).

Manufacturers are occasionally more helpful and do offer free or cut-price materials but there is no personal gain – no-one's been offered stuff for his own house (let alone his relations'!) and no-one would accept as part of a deal. Materials are chosen that will be cheapest in money and energy usage for the public. If we can then get them at lower cost, what we save enables us to do some more useful experiments elsewhere. The programme will indicate real costs.

The main thermal stores are tanks containing 5000 litres of water. However, we want to try either a rock or a salt (heat from fusion) store in the lean-to greenhouse.

We won't be using Glauber's salt. We've been looking at the work of a chemist who can store heat comparatively cheaply at 20°C and 70°cC. He could solve the problem in the 30°-40°C range if the Dept. of Inertia would give him some encouragement. They won't and so he's off to New Zealand where they will.

Brian Trueman

Granada TV Ltd.
Manchester M60 9EA

TM IS GOOD FOR YOU

Dear Undercurrents,

While I wouldn't want a neutral editorial policy from *Undercurrents*, your four recent pieces on Transcendental Meditation seem to reveal an unjustified 'knock TM' policy, and I don't see what your real objective is. We in the West are only just beginning to understand alternative modes of consciousness and if we are to explore this field in any depth we need a little more open-mindedness. In other fields *Undercurrents* does an excellent job of fighting the 'know-all' arrogance of Western super-technology yet when it turns to meditation it assumes complete authority in a field in which it knows very little.

Although I've been into TM myself and teaching it to others for several years I would be the first to admit that there is a lot of unnecessary cultishness going on in the TM movement, and I have a number of reservations about the way TM is being presented. Criticism may well be due, but at least get firmly hold of the subject first so that your criticisms may be well-founded and relevant.

Froth in *Undercurrents* 13 raises the old question of why pay £25 just to be told a mantra. Yes, if it were just a matter of being given a mantra and going away an repeating it to yourself it would be a sure rip-off. But it's far more than that. TM is a very delicate technique which can easily be got wrong and which takes a number of sessions to impart fully and correctly. The way in which one uses the mantra is absolutely crucial. TM is not, as you mistakenly assume, a concentration technique: the whole art of the practice and the need for specialist teaching lies in the fact that it is actually quite difficult to get people not to concentrate at all. Feedback from a teacher might be necessary months or even years after a person first learns the technique if he is to get the most out of it. The fees charged for TM instruction cover all tuition for life rather than just the giving of a mantra. Most of this money gets swallowed up by administrative expenses: the teacher usually sees very little of it.

OK, so not *everybody* gets off on TM (did you really believe that everybody would?) Yet the fact that the majority of the people who start get a lot out of it makes the teaching worthwhile. There are always going to be a few people who feel that they personally didn't get their £25 worth (maybe they would have done if they had been less analytic and let it happen to them rather than rejecting it when they didn't get visions of angels in the first week), but 'blowing the gaff' isn't going to help them or anyone else.

You can publish one of the mantras (incorrectly I might add) but how does this help? Without proper instruction in how to use the mantra you'll be very unlikely to get anywhere. Indeed your instructions to repeat the mantra to yourself over and over again and concentrate on it as long as you can is most definitely not TM and is almost certainly not going to result in any changed state of consciousness – except perhaps a little boredom, some frustration and a general feeling that there is, after all, nothing in TM. All you have proved is that such simplistic descriptions of TM don't get you very far.

As for the suggestion that one should first practise TM with the aid of grass, I too felt this way once. All I can say is that when you really get into meditation you realise that it's a very different high and that dope is a handicap not a help. And with an ounce of good dope costing the same as meditation for life there is little question as to which offers the better value.

It is difficult to find one sentence in your articles which is not a misinterpretation of TM, and it is these sorts of errors which have caused it to be so often misconstrued and maligned. I've always enjoyed Undercurrents and want to continue doing so. So please a little less of this naive arrogance.

Pete Russell

80 St Peter's Street
London N1 8JS

BRADFORD: *Nothing Ventured,*

LUCAS

Lucas Aerospace Combine Shop Stewards Committee

Secretary: E.F. SCARBROW, 86 Mellow Lane East, Hayes, Middlesex.

Leeds Future Studies Centre Conference November 15/16th 1975

A number of organisations and individuals have written to us suggesting that we meet them at the Conference to discuss details of our Corporate Plan. They are obviously under the misapprehension that we will actually be attending. In fairness to them and indeed to us we feel we should make it clear that there never was any suggestion that we would participate. Right from the outset, when we learned that Management *had been invited we felt it would be dishonest and impossible for us to participate.*

We hope you will not think this rigid or doctrinaire of us. The harsh reality of our actual experience at the point of production has taught us some bitter lessons. Even at this moment our members at Hemel Hempstead are fighting to retain *the only non aerospace product at their site, namely Industrial Ballscrews. In these circumstances for management to attend a Conference to discuss our initiative for the 'right to work on socially useful products' seems to us to be hypocrisy of a very high order. (By their* deeds *shall ye know them).*

Were we to attend we would have to challenge the right of Management *to be there and no doubt thereby disrupt the Conference for the many honest and well intentioned participants. In our view this would be unfair and therefore right from the beginning we made it clear that this Combine would not be represented.*

We look forward to continuing a dialogue with the many individuals and groups who have contacted us. We wish your Conference every success and hope it will produce actual *proposals for alternative socially useful products. Indeed one of the things that disappointed us most was that in spite of years of* talk *about alternative technology only from three sources did we get anything positive or useful. The Corporate Plan, which is now almost complete, is therefore largely our own work and of course there is nothing wrong in that kind of self sufficiency. I mention this only to show that if groups or conferences are to have any relevance to industrial workers they must deal with concrete issues and not just concepts.*

Yours sincerely
E.F. SCARBROW
Secretary *6th November, 1975*

"One and a quarter million unemployed.
People's creative and inventive potential not being fully realised.
People denied the right to work on socially desirable products and services.
Is Alternative Technology the answer to these problems?"

THAT QUOTATION, from the first paragraph of the prospectus describing the Bradford conference on 'Industry, the Community and Alternative Technology', summarises the main question to which the conference organisers, Roland Chaplain and his associates at the Leeds Futures Studies Centre, felt the conference ought to find at least the beginnings of an answer. Did it succeed? In short, I think the verdict must be No.

Certainly, the conference, held at Bradford College on November 15-16, was in a limited sense a success. It provided a good excuse for a largeish number of people interested in Industry, and the Community, and Alternative Technology – and many other, often contradictory, things – to get together in an enjoyable ambience and talk informally about the issues which concerned them. But this interchange would have happened in any gathering of the same people under almost any pretext.

A conference can only be judged a success if it makes some progress towards the clarification of at least some of the issues which it has been called to discuss. The Bradford Conference, by this criterion, was a failure. It not only failed to come up with any conclusions, resolutions or proposals for further action, but it failed even to bring out into the open any differences of opinion concerning the key issues we were supposed to be discussing. Of course there *were* divisions of opinion. Some of them surfaced at various stages, but most were left unarticulated. It would have been very

A.T. is Dead – Long Live Radical Technology!

THE BRADFORD CONFERENCE on Industry, Technology and Alternative Technology attracted an amazingly-wide range of people – environmentalists, conservationaists, alternative technologists – with a similarly-wide variety of ideological persuasions.

What brought them together was the initiative taken by the Lucas Aerospace Combine Shop Stewards Committee (see UC 12 and 13) who have embarked on a campaign for "the right to work on socially needed and useful technologies".

Many ecologically inclined activists have spent years trying to waken decision makers and the public to the need for a radical rethink of technological and environmental policy: for them the Lucas initiative was the first ray of sunlight in an otherwise gloomy situation. For those with a radical perspective, for whom the social changes which they associated with alternative technology would not come about by retreating to hill farm communes but only through grass roots action in the community, the Lucas workers' campaign was an immense breakthrough. Environmental lobbyists, too, felt that the Lucas workers could champion their cause; alternative technologists dreamed of converting high technology industrial units to AT production; trade union activists saw the Lucas campaign as a welcome attempt by trade unionists to extend collective bargaining beyond wage-related issues. It was all things to all people.

Radicals, liberals and concerned conservatives each found something attractive in the initiative – even Sir Keith Joseph was rumoured to be interested. The stage was set for a perhaps not entirely well-intentioned take-over by a vareity of middle class groups, all eager to use the Lucas initiative for their own purposes.

It should have come as no surprise, then, that the Lucas Combine Shop Stewards Committee had decided, quite early on in the planning of the conference, not to be involved. An organisation like the Combine, involved as it is in day to day struggles against speed up, redundancy and 'rationalisation', and experiencing at first hand the reality of exploitation, alienation and managerial control, is unlikely to have much time for a conference which tables as part of the agenda for one of the workshop sessions the need to 'do away with sides'. Even less are they likely to want to meet with the Lucas management, who were also invited by the conference organisers under a policy of 'political neutrality'. For the workers at Lucas, their campaign is part of a struggle to save jobs, to resist management's unilateral control, to challenge managerial prerogatives – not an attempt to 'work together'. Obviously this campaign, and the many other similar struggles going on in industry, have as an aim a society in which trust and co-operation (but not necessarily consensus) are the norm – but the way to this future is not by sweeping present conflicts under the mat. Rather it is by struggling to abolish class and exploitation.

The results of the Stewards' refusal to be involved were in fact positive. The ideological aim underlying the conference – that of generating an unwarranted consensus, of seeking to reconcile

Nothing Gained

valuable to have had the spotlight turned on these largely unspoken differences – mainly to do with the degree to which people felt that radical political change was a necessary accompaniment to an alternative society.

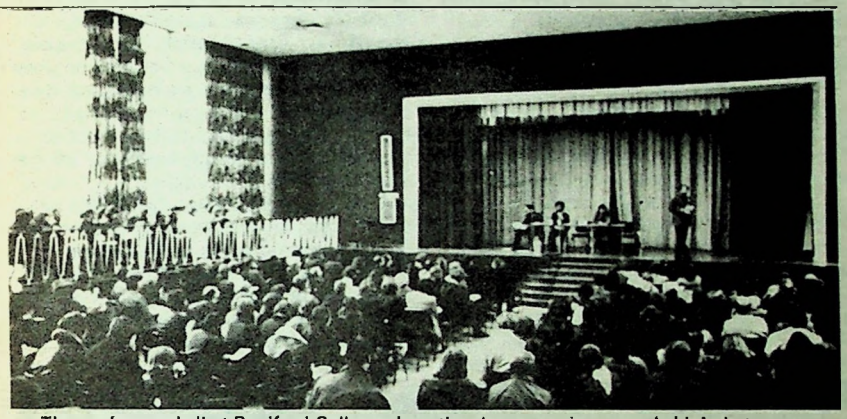
But the chairman of the final plenary session, after the various commission representatives had presented the results of their deliberations, failed to allow *any* time for an attempt to achieve a constructive synthesis. Even if we had not been able to agree, it would have been good at least to have agreed on the extent to which we disagreed.

It is hard for me to rid myself of the impression that this failure of timing, which contrasted strangely with the careful organisation of the rest of the event, was not entirely fortuitous. The organisers seemed anxious to prevent any dirty linen from being washed in public. And they succeeded.

Of the four reports that follow, the first two, by Dave Elliott and Diana Manning, present more-or-less opposing views of what happened. The third, by Alan Warr, focusses on the unofficial 'alternative products' working group, set up at Bradford with the specific aim of responding to the Lucas Shop Stewards' Combine's request (see letter, page 10) for help in the task of evaluating various potential alternative possible products.

In the last report, Tony Durham interviews Jack Mundey of the Australian Builders' Labourers Union, who aroused the almost-universal admiration of the conference when he told of his union's extraordinary success in halting three billion dollars worth of socially or environmentally undesirable projects.

Godfrey Boyle



The conference hall at Bradford College where the plenary sessions were held. In between, participants split up to work in Commissions investigating specific topics.

fundamentally conflicting interests – was put squarely on the agenda.

With the realities of present-day industrial conflicts in mind, those eager to get AT implemented had to face a basic question of political strategy and commitment. Was AT development to be part of a relatively-smooth programme of environmental reform, orchestrated by government and industry, which left socio-economic relations basically unchanged, or was it to be part of a programme, fought for against the vested interests, of radical social, political *and* technical change?

The AT movement is of course often split on this sort of issue. Some are indifferent to the need for radical social change – hoping rather simply to get AT together and thus avoid the resource crisis that looms ahead. For the radical wing, this is just a species of technical fix: the really important changes must be social and attitudinal, and to implement these changes we must get involved with the ongoing struggles in industry and the community.

The letter from the Lucas Combine, distributed at the conference, had the effect of polarising the two wings. In each workshop session there were those who took up each position. The radical wing took up the challenge laid down in the letter and sought to discuss AT in practical political terms – how could trade unionists organise around environmental issues, what were practical strategies for extending collective bargaining, what were the implications for re-training and education generally, what was the role of AT in community development, what use could be made of liberal reforms, what were the dangers? Commission 8 in particular looked at the hardware options open to Lucas – and came up with a detailed list of possible products mainly of a 'transitional' nature based on a set of criteria of social and environmental appropriateness. The work of this commission – and of the ongoing network which it created – will hopefully be of use not only to Lucas workers but also to any other groups of workers adopting the 'Lucas' strategy. Possibly the Lucas workers, being well used to small batch production of many different items, are less in need of external technical advice than others. But when mass production workers also take up the campaign then technical advice from those who see AT in both its environmental *and* political context will no doubt be useful.

The conference was a success in as much as it showed that liberal enthusiasm for environmental reform is not enough – what is needed is a positive commitment to radical changes, brought about through the generation and implementation of radical social and technological ideas. Radical alternative technologists must ally themselves to those involved with the ongoing political struggles and seek to develop radical technologies which both aid the transition to and can be the base for a society in which the idea of 'working together' will be the norm rather than a propagandist phrase designed to conceal fundamental conflicts of interest.

Dave Elliott

STATEMENT OF COMMISSION 8 ON THE BRADFORD CONFERENCE ON 'INDUSTRY THE COMMUNITY AND ALTERNATIVE TECHNOLOGY.'

We make the following statement in response to the letter from Lucas Shop Stewards Committee which apparently curtails the possibility of any dialogue and mutual support between the Combine Workers and the somewhat nebulously-termed ALTERNATIVE TECHNOLOGY movement. Some of us believe that it is important to recognise the split between the consensus and the radical approaches in this movement. We make this statement not to attack the Conference's organisers but their consensus ideology. It is vital that we all learn from the mistakes of this Conference.

STATEMENT.

We totally support the attempts of the Lucas Aerospace Shop Stewards Committee to redirect their work towards more socially useful ends. At the same time, we recognise that it will be impossible to develop products and production methods which are socially and environmentally desirable, unless, simultaneously, there are moves towards a total restructuring of society. In the case of Industry, we believe that this implies joint Worker and Community control. We support, therefore, the Lucas Shop Stewards' rejection of any attempt to deny the incompatibility of employees' interests and the interests of shareholders, management and directors. We hope, too, that the embryonic links between the Lucas Combine Workers (and other technological work-forces) and the radical sectors of the Alternative Technology movement can be expanded. At this Conference, this latter sector has begun a discussion of what might be socially useful and what is not. In this context, we drew up a list of suggestions for technological development. We see these as transitional ideas in that we do not expect them, if developed, in themselves to alter power relations and ownership or modes of production in our society. We see them, instead, as but a part of the process of societal transformation.

Wishy-Washy Liberals of the World, Unite!

OH DEAR, oh dear, oh dear, What went wrong with the ICAT conference? It promised so well. There was a wider social mix present than at any previous AT event and if it is adequately followed up, it should prove to be a significant turning point. But I came away disillusioned and frustrated and worse than that, something there was that tasted sour.

Disappointment stemmed from the lack of anything new. The final plenary session which should have raised morale and provided us with a realistic strategy for change, was a boring recitation of well known platitudes, too general for positive action. I found myself doubting the whole movement. Is our Utopian vision possible, or is it absurdly naive? Is it even desirable?

Now I'm going to blaspheme. Watch your blood pressure and if you find yourself muttering "Fascist swine" between clenched teeth, it could be that I am a Fascist swine . . . Or that you are a political bigot.

For a start, the under-representation of women at the conference was atrocious, and worse still, no-one seemed to notice. I got the distinct impression that where women were mentioned at all, they were regarded as a deserving minority like the disabled, and that, come the revolution, they would overcome their handicaps and turn into men. Big deal! There was no mention, at least at the final plenary session, of why so few women are interested in technology, orthodox or alternative, and precious little consideration of domestic work, child care, and 'soft' issues such as 'informal' education, health facilities, the role of the elderly, leisure, art, or — dare I say it — fun.

A dreary scenario emerged of an ecologically compatible, but narrow-minded society. Education would be strictly utilitarian. We would learn politics, ecology, technical skills and enough science to be useful. We would not specialise and would acquire many skills so our socially useful work at the neighbourhood factory would not be monotonous. But it seems that we would be denied all sophisticated services. What about medicine? Well of course our wonderfully balanced, stress-free life would prevent most ill health. But there's not much evidence that obstetric complications, fractures or infectious diseases, amongst others, are all stress- or diet-induced. Are we also to do without good communications? When I mentioned that miniaturisation in electronics had actually made the whole field remarkably efficient in terms of energy and resource usage, while admittedly still dependent on mass production, I was regarded as a heretic. Must decentralisation necessarily involve small-mindedness? A return to gossipy little communities, seldom exposed to new faces, new ideas or even to information which isn't useful, is my idea of hell. Surely such a society would be riddled with petty prejudices? How long before the barricades go up on Holland Road to keep the barbarians of Shepherds Bush from straying into Kensington?

I found that mere mention of the word 'compromise' at the conference labelled me a reactionary, or worse still, a wishy washy liberal. Well maybe they're right. Wishy washy liberals of the world unite! I do not believe that anyone knows what is best for everyone. All we can do is identify faults and suggest alternatives. There are no simple, one-off solutions to the world's problems and the most valuable feature of the decentralisation which we advocate is that it permits diversity. A great many alternatives can be tried and if they prove to be no good they can be scrapped without catastrophic repercussions. The only thing we are in a position to aim for, ignorant, biased and unrepresentative as we are, is a system which can encourage and accommodate numerous 'experiments' in work, education, technology and social relationships, providing these are not irreversible.

Another aspect of the particular species of political orthodoxy which emerged at the conference was the use of the term, The System, to represent everything we are supposed to hate. The fact that we are products of The System, and think the way we do because of it, was conveniently overlooked, and any suggestion that we can do anything constructive until it has been Utterly Destroyed was dismissed as bourgeois, reactionary, etc. etc. (I felt there were strong biblical overtones here).

Well, I agree that our society leaves much to be desired, but it is worth pointing out that most of the world is worse. (At this point, purple with indignation and muttering obscenities, some readers will doubtless tear this article to shreds and read no further). My own travels in East Africa, the Middle East, Southern Europe, North America and Pakistan have convinced me that our system is not the worst the world has to offer, and rumour has it that Latin America, South Africa and Russia have their defects. In fact there are precious few countries in the world where a conference such as the ICAT could be held at all. I mention this only to point out that whilst we have plenty to gain, we also have a lot to lose. Sweeping away the present system in one go might lead to Utopia, or it might not and while there is a finite possibility of things getting worse, I suggest that this is not an appropriate course of action.

I was dismayed and disturbed by the reaction of so many of the conference participants to the knowledge that Roland Chaplain had spoken about ICAT to Young Conservatives and to Sir Keith Joseph. Roland had made it clear from the start that this event was to be open to anyone who wished to attend and at the opening session he appealed to us all to listen with tolerance to opposing points of view. But no. Freedom of speech apparently applies only to those who think the same way as we do. But I thought we were concerned with the old clichés about freedom, co-operation, love and peace. To support such ideals and yet to oppose free speech, to be fired by hatred, to believe that the end justifies the means, surely this is Orwellian 'double think'?

A feature of the male world (perhaps that's unfair as we have no female ones for comparison) is the split between private and public life which permits all manner of hypocrisy. We must never forget that the internal revolution is just as important as political and institutional change. Even if we cannot live up to our ideals, we must be honest about our failings and our absurdities. I was put off not just by what was said at the ICAT conference, but by the pompous, dogmatic, boring way in which it was said, and I would suggest that the two essential qualities for anyone with a sense of mission are humility and humour. Small may be beautiful, but small-mindedness is ugly . . . and dangerous.

Diana Manning

Hot, cheap, tasty food was provided by the Bath Civil Aid Group, who did the catering at COMTEK

TECHNICAL FIXES ARE NOT ENOUGH

AN EXTRA working group of about 20 people, set up independently of the Conference organisers, came together at Bradford to look at specific, socially desirable industrial products.

Towards a Definition of a Community-Industrial Complex

From the beginning of its discussions, it was recognised by this 'alternative products' workshop that the *type* of society and the *form* of industrial production are intimately related. This does not mean, however, that specific social systems are uniquely described by a choice of technology, 'alternative' or otherwise. Not all sophisticated technologies require heavy investment in machinery, for example (the electronics industry is often labour-intensive); conversely, many technological alternatives to dominant sources of commodity production can be socially undesirable (the production of nuclear energy carries a greater health risk than pollution caused by fossil fuels, argue environmentalists). Similarly, alternative technologies, in all senses of the phrase, could operate either under community or private control.

In recognition of the need for a much broader social restructuring, the 'alternative products' group decided first to concentrate on a specific industry, such as Lucas Aerospace, and its communal environment. Some important characteristics of the kind of production to which Lucas Aerospace is geared are:

1. Very high precision.
2. Small batch production: a few to 100 items (instead of the 1000s typical of much of the engineering industry).
3. Accuracy in repeated items.
4. High-technology materials production.
5. Typical product size less than $1m^3$ (e.g. aircraft components).

The literature of the 'alternative technology' movement abounds with suggestions for the re-orientation of high technology industry. Two examples are the manufacture of (1) Control systems for use with environmentally sound or energy conservative machines and (2) tools to produce such devices (process engineering). Such products would, if adopted by industry, merely reform the mode of production without altering established patterns of ownership, and therefore control, of industry. Without such a change, it is difficult to see how the new product range could reflect the needs of the community rather than the capriciousness of consumerism. 'Alternative technology' is now being mass-produced: there are over eight different types of solar energy collector on the market in the UK. If 'AT' was ever meant to be a technology for an alternative society – that is, a socialistic one – this function has been absorbed by what could be described as consensus politics.

Society's needs should be determined through a system which alters relations of production so that the two sectors, industry and the community, are formally connected and mutually reactive to change – what might be called a 'Community-Industrial Complex'.

TABLE 1

Societies characterised by:

Socially desirable ('soft'/'alternative') technology	'Hard' technology
1. Minimum use of non-renewable resources including energy	Economy in use of non-renewable resources a low priority
2. Low environmental impact	Significant environmental impact: pollution and health risks
3. Varying degrees of communal and regional self-sufficiency	Interdependence at regional or national levels
4. Communal ownership of means of production	Authoritarian or scientistic factory control: Subjective alienation of workforce. Corporate ownership – objective alienation.

Consensus and Radical 'Alternative Technology' Characteristics

Alternative industrial products in themselves are no answer to the problems of diminishing resources, mal-employment, pollution and wastage common to dominant methods of production. The example of Lucas Aerospace is particularly interesting because 'AT' has come to the rescue of management and workers alike: in an environment of shrinking production due to a reduction in the size of the aerospace market of late, it is like a blood transfusion. The acid test of the success of this incorporation of the AT movement into industry will be if production can be geared to the community simply through a 'technological fix'. This was considered formally impossible by the 'alternative products' group who distributed a leaflet which said:

> "... we recognise that it will be impossible to develop products and production methods which are socially and environmentally desirable, unless simultaneously there are moves towards a total restructuring of society."

Referring to the role of the 'Alternative Technology' movement, the statement went on: "Some of us believe that it is important to recognise the split between the consensus and radical approaches in this movement." This very important distinction determined the group's approach and convinced many of us of the danger of attempting simply to impose new criteria on a workforce such as Lucas without deriving some framework for selecting socially desirable products. To this end, some characteristics of societies using 'alternative technologies' were tabulated (see Table 1).

This table is not simply a list of antonyms for 'good' and 'bad' societies. The fundamental difference between the systems is to be found in the way costs are measured – that is, in the economic philosophy behind such terms as 'efficiency', 'cost-benefit' and so on. Economies in the 'hard' society depend on the exchange values of the commodities produced whose price and value therefore see-saw in response to so-called market forces: often the retail price is poorly related to the cost of material, value-added by labour. On the other hand the 'soft' society's goods have prices which reflect their use value to the community: various forms of social costing may apply, which take into account hidden costs of production like travel time, pollution, community disruption and the like.

On their own, items 1 and 2 (above) could easily be features of a consensus perspective on 'AT' from which industry, with government assistance, could simply re-emphasise its priorities by attempting to recycle by-products, treat toxic waste and so on. In some respects, the Corporate Corporate Plan of the Lucas workers takes this perspective, and while the 'alternative products' group thought it a step in the right direction, the group concluded that, for the work force to succeed in redirecting their jobs towards more socially-useful ends, it would be necessary to integrate technological change with alterations in the social, environmental and political spheres. It felt that items 3 and 4 in Table 1 are all-important in giving the community a say in the planning and control of industry.

This table, of course, is incomplete – Robin Clarke of Biotechnic Research and Development (BRAD) lists 35 criteria for 'Soft' technology societies[1]. Another point is that it is not necessary to place high technology exclusively in the right-hand column: there is every reason to

suppose that changes in industrial hierarchy and ownership patterns could help to alter social relations to the community's benefit. Finally, item three need not imply the end to international trade, only an end to the exploitative relationships by which the third world is systematically underdeveloped and an end to the wasteful division of labour by which primary commodities are imported, processed and exported for their enhanced exchange value.

Selection of Alternative Products and Re-assessment

Rejecting the consensus view of 'alternative technology' as a panacea for the problems of society, the group drew up a long list of product suggestions, some of which are reproduced in Table 2. These suggestions were eventually grouped together: entries 3,9,11,20 and 22 are all control devices for use with 'AT' equipment; 4,5,8,10,14,21 and 23 are prime movers producing cheap, decentralised energy. But this was not enough. In the light of previous discussion, criteria for selection were then applied to these products on the basis of their protential to alter social relations of production either positively, negatively, or not at all. Clearly, this rating depended on the extent to which the group considered that a particular product would be compatible with a 'soft' society as characterised in Table 1. Specifically, we were concerned to ensure that, if a technology should affect ownership patterns or decision-making processes, we would want these effects to include:

1. De-professionalisation in areas like health care, construction and building work, agriculture, etc.
2. Community mandates on the size and extent of industrial production.
3. Integration of productive and consumptive sectors vis-a-vis planning, control and implementation.

Symbolically, I rate such technologies, which have a positive potential for the advancement of social relations, as 'ASR = +'. Technologies having neutral or a negative potential to achieve these ends are denoted 'ASR = 0' and 'ASR = −', respectively.

The list that follows is not intended to be prescriptive, definitive or final. The *mechanism of selection* based on the potential of the product to be socially useful is what is important.

It must be emphasised that it is not the entries in this list that are notable but rather the way in which they were assessed and re-assessed in the light of the above discussion. For example, the control devices in the table may provide an incentive for the use of 'soft' technologies which, in themselves, have a potential for changing social relations in the community-industrial complex.

The 'low cost' products present problems. How do you assess cost? – by cost-benefit analysis, multivariate analysis or what? Inevitably, such techniques employ value judgements which are often wrapped in a cloak of neutrality. Costs must be based in the socio-political context in which community needs are defined.

Entries 15 and 19 could have the effect of de-institutionalising people's health care and giving them control over their own bodies. The implications of this are not merely to place potentially dangerous techniques in the hands of the unskilled and incompetent: women's groups have already got together in Europe and the U.S. to train themselves in the use of gynaecological methods. Such a training would cover high technology devices such as those used to sterilise instruments. The aim of this movement is to demystify procedures that are known to be oppressive in practice.

The prime movers which performed the function of engines were assessed by their potential to reinforce a public rather than a private means of transport.

Table 2 Product range: initial list

Product	ASR Rating	Product	ASR Rating
1. Bearings	0	2. Orbital satellite generating station	−
3. Wind speed governor	+	4. Low cost Stirling engine	0 +
5. Fuel cells	+	6. Disaster relief kit	+
7. Non-moving part pump	0	8. Low cost hydro-electric system	0 +
9. Servo controls for 'AT' products	+	10. Methane plant/motor	+ 0
11. Light source photo-electric control	+	12. Low technology grain dryer	+
13. Solar electric fence	0	14. Small pyrolysis device	0 +
15. Low technology hospital equipment	0 +	16. Tracking with solar batteries	− 0
17. Simple, programmable machine tool design	0	18. Long heat pipes	+
19. Personal control technology	+	20. Basic energy control linkage	+
21. Water turbines, free stream	0 +	22. Low technology instrumentation	0 +
23. Low pressure rotary engines	0 +	24. Spade	+

The list's major danger is that it suggests that there could be purely technical solutions to social problems, rather than a move 'towards a total restructuring of society'. The last suggestion, of the spade as an alternative agricultural tool to the tractor is borrowed from Robert Owen's *Report to the County of Lanark* in which he suggested that the problems of food production and unemployment at the turn of the 19th century could be solved at a stroke by replacing the horse and plough by men with spades, thereby emphasising the social effects of technology.

The crucial problems, it emerged, are two-fold:

1. How to establish, maintain and operate a democratic decision-making process.
2. How to involve whole communities and raise them to a level of consciousness at which they can take viable decisions.

A solution to these problems would seem to involve at least these three steps:

1. **Determining the community-industrial complex.**
   This involves the establishing of bodies for consultation both in the factory and in the town to look at the structural features of the environment.
2. **Matching community needs with productive characteristics.**
   Designs and reports based on 'soft' technology options: new channels of implementation and control.
3. **Derivation and re-assessment of product range.**
   Prototypes, usage and redesign of products: selection of 'liberating' technologies.

But there are no easy solutions to the problem of how to achieve socially desirable production. Read in isolation, Table 2 looks like a naive technological fix which has employed a use-abuse model of science. This is blatantly inadequate: not only is it important to realise that no fundamental change in the pattern of consumption will occur without without a change in the ownership and control of the means of production, but that the mode of production itself originates historically from a specific and economic choice of technical development.

Alan J. Warr

Thanks to John Irvine, Pauline Marstrand and the Dept of History and Social Studies of Science at Sussex for their help with this report.

1. Cf. David Dickson *Alternative Technology and the Politics of Technical Change.*

THE UNDERCURRENTS-LID WIND GENERATOR

WINTER MAY BE the best time for strong winds, but it's the worst time for experimenting with windmills, so we have once again little progress to report on the UC-LID Wind Generator.

A group of wind enthusiasts at Cheltenham Art College recently built a wind generator according to our design. They incorporated a few interesting variations which we'll be reporting on next issue.

Just too late to make this issue's deadline is the promised design for a transistor inverter, but it should definitely be in UC15, as should be the results of some experiments with belt-geared alternators, rather than modified direct-driven dynamos. This arrangement ought to produce quite a bit more power than the 25 watts we've achieved so far. And since the alternators have built-in control boxes, to reduce to a trickle the discharge through the field when no wind is available, we're confident of overcoming the 'cut-in' problem mentioned in previous episodes of our wind saga. Watch this space.

Workers who *care* about the social and environmental effects of what they produce?

People in Britain still don't take the idea altogether seriously, as reactions to the Lucas Aerospace shop stewards' plans have shown. In Australia, however, everyone takes the Builders' Laborers of New South Wales seriously, following their highly successful and imaginative series of actions known collectively as the Green Bans.

NO MORE WORK FOR WORK'S SAKE

Kelly's Bush is described as the last piece of natural bushland on Sydney Harbour. It's one of the few wild places left where people from the city and suburbs can escape and relax. When the A.V. Jennings group proposed to cover the site with flats and houses, local people and conservationists fought the plan with meetings, letters, petitions and newspaper items, but without success. It reached the point where women were lying down in front of the bulldozers, and then, in desperation, the protesters called up the Builders' Laborers Federation. The union overcame some doubts about supporting middle-class conservationists, and proceeded to ban all work on the site. They warned that if scab labour was brought in, then another Jennings project, an office block in the centre of Sydney, would be left half-finished as a permanent memorial to Kelly's Bush. The developers left Kelly's Bush alone.

Since then over 40 similar bans have been imposed in the Sydney area alone. But the Builders' Laborers have never intruded unasked: they have always acted in response to a call for help, usually from local residents or environmental groups.

They halted a plan to build 50-storey office blocks in the Rocks, one of Sydney Sydney's oldest and most picturesque districts. They saved the Sydney Botanic Gardens from a scheme to build an underground car park for the Sydney Opera House: the plan would have doomed three magnificent trees, and exposed other other fine plants in the Gardens to air pollution. Another valued green area, comprising Moore Park and Centennial Park, was saved from becoming a a grandiose sports complex for the 1988 Olympic Games. And another $A 400 million worth of skyscraper plans were scrapped when the Builders Laborers were asked to protect the long-established residential community of Woolloomooloo.

Jack Mundey pictured recently in London.

There have been Builders' Laborers bans for other reasons, too. Bans on new building were imposed at Macquarie University over the exclusion of a homosexual student, and at Sydney University when the authorities refused to run a course on 'Philosophical Issues in Feminist Thought'. The course later got the go-ahead.

As secretary of the Builders' Laborers New South Wales branch, Jack Mundey was in the forefront of these struggles. Though he himself stresses that nothing could have been achieved without the efforts of union members and the general public, Jack Mundey was seen as number one target both by the employers, who on one occasion offered him a $A20 million bribe, and by the state, which had him on a charge of contempt of court for statements he made on television. His opponents also made much of the fact that he was a national committee member of the Communist Party, though as our interview with him makes clear, his views are far removed from the CP mainstream.

Jack Mundey has just spent three months in Britain, financed by the Gulbenkian Foundation and the Sainsbury Trust. Tony Durham began by asking him whether, from what he had seen, he thought anything similar to the Green Bans could happen here.

"I think it's happening; not in the same way as it happened in Australia, but I do believe that ordinary workers down on the job are commencing to think about what they are doing with their labour. Maybe it's wishful thinking on my part, but I'm pretty confident that workers are looking beyond just the immediate issue of wages and conditions."

What is your position about wages and the consumer society? Do you think that workers should be prepared to accept a reduction in standard of living, for other long-term benefits?

"I think it's a dilemma. I wouldn't suggest that the workers' wages should be cut. To put it briefly, the workers in the Western world are getting the crumbs off the table. On the other hand, I do think there's a contradiction between the living conditions of people in the Western world and people in the third world."

One theory which is often proposed is that if we just let the system continue to grow there will eventually be enough to share out between everyone, between the workers in the capitalist world and the workers in the third world.

"I don't think it's possible. We're on a finite globe and therefore what we do impinges upon all people, no matter how modestly they live or how well they live. Growth has to be allied with 'growth for what?', 'production for what?' and therefore I reject the contention that growth in itself will be the panacea for the working class. There's got to be, number one, a redistribution of the present growth; but probably more important than that – **which growth is essential in the interest of whom?**"

Now do you think that there's much hope of the attitudes of the average worker changing in this respect? What do you say to workers who say: "what I want to do is work more overtime and make more money"?

"There probably was a period a few years ago when they would say they could solve part of their problems by working more overtime. But very few people would put that forward now as a realistic proposition. I think that workers are now beginning to think more about the whole work ethic. I don't want to give the impression that all workers are concerned about it, but some are. And I think once you get some workers concerned about it you'll get to the next stage which is that they'll think more deeply and say: why not go beyond the question of the right to work, to the next thing that raises a question mark, the right not to work? The right to work or not to work, on full pay. That must be the next humanitarian attitude that people who are concerned about unemployment, about decent living standards for all people, must think about."

Do you think that workers could be happy not working and yet drawing full pay? Surely most workers feel some kind of demoralisation through being unemployed?

"I think that's a nice line put forward by

"Most workers are pretty unhappy working."

those with real power. I think that most workers are pretty unhappy working. Most of the industrial workers I know, if not all of them, work to ensure that they can feed and clothe and shelter themselves, nothing much beyond that. I don't think that work for work's sake means anything under capitalism or socialism or any other system. The main thing is that people are now questioning whether in fact we should work and, whatever work we do, whether it's socially beneficial to the community at large."

When you impose a ban on something, that's essentially a negative action, isn't it? But do you think there's much that workers can do in a constructive *sense — making sure that the right things get done, rather than simply making sure the wrong things don't get done?*

"I would contend that whilst the Green Bans were mainly a negative action, at least in some areas, such as the Rocks in Sydney, the people formed their own group of planners and said: 'no, we don't just want to stop building. We want to build. But we want to build buildings that are of use to the public and the people of the Rocks.' I think that is not negative, that's positive. It is far more far-reaching. In fact it questions every avenue of work: nurses, how they work; metalworkers, how they work; workers on the Concorde, whether they build it or not; workers in the car factories, whether they go on making more cars. The Green Bans were environmental-social; now the next thing is, what do we do with our labour?"

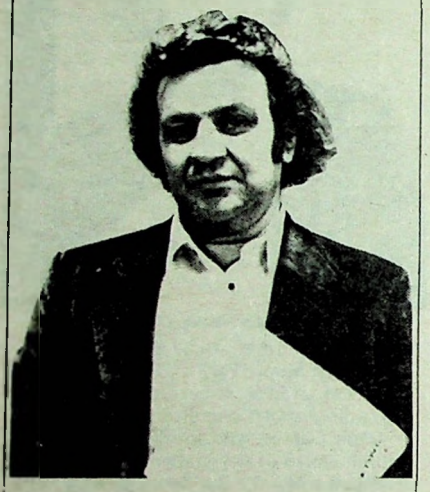
"Workers are looking beyond the immediate issue of wages and conditions."

Well do you think there's any real chance of getting the workers on the Concorde, or the workers at the Chrysler car factories, to actually ask *to do some different kind of work? What they want is to have their jobs as they exist now preserved, is it not?*

"It certainly is. I think that's the main thing that concerns them. I'd love to be more confident in thinking that the workers will take a radical new approach. I don't know whether that'll happen in the short term. In the long term it must happen, because if it doesn't happen, well then we're history.

I'll stick my neck right out and say that if in fact the value system which we now have in all countries of the world including the USSR — to a lesser extent China, because China is still mainly agrarian, but nevertheless industrialising very quickly — if we go on with the value system we've got now, producing more goodies, more consumer items, well then we're gone. There's no chance that humankind can rape and destroy this earth in the way it has in the last thirty years in particular–since the end of the war. It can't go or."

"There's no chance that humankind can rape and destroy this earth in the way it has in the last thirty years."



"What has to be done is to refute the idiocy that 'it's only under socialism that problems of ecology can be tackled'."

There are some workers who obviously agree with you in some respects, and the example that comes to mind is the Lucas Aerospace Shop Stewards. What do you think are their chances of actually setting up an alternative kind of production?

"Very difficult. I think that we,the Builders Laborers in New South Wales,had certain things going for us. We had a knockout blow in our hands. We could refuse to knock down buildings. We could refuse to put the first spade into the earth to build new buildings, and so we had a lot of bargaining power. The Lucas

"Which growth is essential in the interest of whom?"

Aerospace workers need much more sophistication, both in their arguments and in what they have to do. It's a challenge now for them to produce the goods, because it's not much good having theories. They've now got to go beyond the theorising stage into the practical stage of doing something, of putting it right up to the management about what they want to make, and then publicising that, getting it out to the people what they're about. I think if they do that they'll win support from very unexpected quarters, as we did."

Do you feel that it's worth trying to set up some of the alternative methods of production 'before the revolution'?

"Definitely. I think that what has to be done is to refute the idiocy that 'it's only under socialism that problems of ecology can be tackled'; and also the idea that the cities have no future and therefore we should leave them and all go back to the land. People talk about 'giving away' cities, and say that cities have no future. How are you going to give away London, with 12 or 14 million people? The Tokyos and New Yorks? People might like to give them away, and all have mental trips into going back and living in nice quiet rural surroundings, no doubt surrounded by ample food and vegetables and clothing and all the rest. How they'd arrive there, I don't thing those same people have considered very much.

"Why not go beyond the question of the right to work, to the next question, the right not to work?"

So I think that now that the Industrial Revolution has occurred, we've got to temper it, we've got to tame it, we've got to make it a system which understands ordinary human beings; and if it does that that, then we're preparing our way for a real revolution, a revolution about ethics and values and about decency — and naturally that revolution can only be socialist-oriented.

"We had a knockout blow in our hands. We could refuse to knock down buildings."

"We don't just want to stop building. We want to build buildings that are of use to the public."

AROUND THE WORLD IN A T DAZE

Andrew MacKillop was one of the pioneer advocates of alternative technologies in Britain in the early 1970s, and founder of the AT hardware company Low Impact Technology. When Andy handed over the running of LIT to Conservation Tools and Technology in 1974, he set out on a marathon world trip to see what was going on in the alternative technology field in some other countries. Here's his own distillation of what he saw.

SINCE LATE in 1974 I have been travelling and working in North America and Australasia. Everywhere, in varying degrees, I found a confluence of key 'crisis' issues: energy, environment and the mix of human problems that we can call social entropy.

Coming back to the UK this summer, with its fashionably-revamped 1930 style slump, the vast difference in response to this storm of crises was brutally obvious.

Britain is particularly vulnerable to the closing of its colonial and neocolonial trade routes to the heart of other peoples' resources. Its inability even to feed itself is yet more stark – a screw that will tighten as the relatively self-sufficient Celtic lands disengage from their old friends, the English, who planted Ulster and cleared the Highlands in their 'civilising mission'.

One big reason for the British, or English, inability to respond to reality must be that, incredibly, the country still has a 'ruling nation' fantasy; but an even larger reason is the North Sea Bubble. This expensive oil, requiring 20 times more energy to obtain than Arab oil, has taken on a near-mystic significance, a reason to postpone any thought of change even in energy policy, let alone lifestyle – a vindication of business-as-usual.

Canada Dry

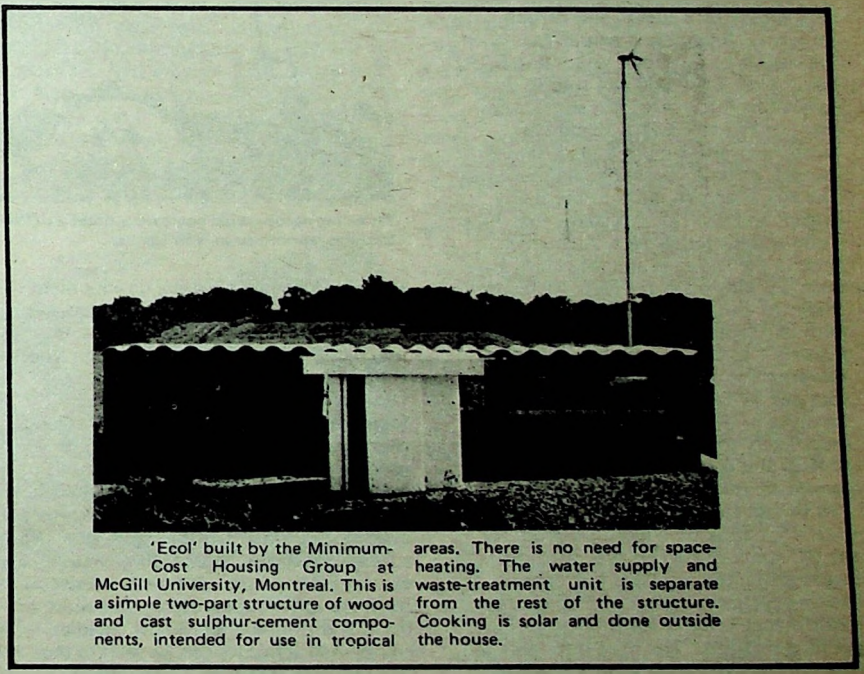
Other countries too have peered over the cheap energy brink, but have not retreated into ritually mouthing the old platitudes, as if they can keep the inevitable at bay. Notably there is Canada, my first stop, where I was invited by its purposive and generous Environment Ministry and Science Council. Seemingly, Canada is everything the modern consumer Briton could desire: a peaceful and vaguely-Anglicised version of that materialist's nirvana, the USA. But Canadians are pragmatic and thoughtful beneath their egalitarian, stress-free public image. Their oil and gas resources are concentrated in the western Provinces, supplying oil by pipe and through trade to the oil-deficient east. Overall, their energy picture is one of declining resources, with the current generation of cheap oil being exhaustible within ten years.

New, or second-generation oil resources do exist – indeed the Alberta tar sands, like Brazil's interior, have been the 'resource of the future' for a long time. Since the late 1960s various oil corporations have been forming consortia to exploit the oil, which is abundant, but *very* potential! The consortia made the shocking discovery that extraction and processing in iron winter conditions could raise costs over $25,000 per barrel-day capacity. As a result, in late 1974, the consortia aborted the whole project and ran to the Federal and Alberta Governments for help. In the spring of 1975 the first building project, a 40,000 barrels per day facility, was announced by the taken-over consortium. The price tag was a minimum of $1 billion – and by the time the facility is operational it could be 50% more. Compared with this kind of cost even North Sea oil is cheap.

The tar sand oil project (known as *Syncrude*) has turned out to be a big stimulus to conservation and the development of renewable energy sources (RES): for if prohibitively-expensive Syncrude is the next generation of Canadian oil, then something has to be done about conserving *this* generation.

The slow collapse of the pre-takeover Syncrude consortia, and an evaluation of its own fast-diminishing resources, caused the radical NDP Government of British Columbia to grasp the nettle. It announced in December 1974 that oil exports would be completely phased out by 1980, and that its gas would be charged at the highest normal rate – in effect a price rise of around 55%. Since BC oil and gas is the main energy source to the deficient northwestern US states, this became an intensely political act. At one stage in early 1975 there was a serious threat from US politicians in the NW border states to forcibly close the trans-Canada oil pipelines that in places dip into US territory.

Conservation and RES programs were now openly on the table – but that does not mean that there had been little support previously: since the late 1960s Canada had been quietly seeding many such programs, especially where there was direct environmental benefit as a spin-off. Canada actually seems to care about its environment, *and* puts its money where its mouth is. Its Environment Ministry, working on an easy access to information and people principle, is actually concerned with protecting and improving the environment – not building motorways and putting up council house rents.



'Ecol' built by the Minimum-Cost Housing Group at McGill University, Montreal. This is a simple two-part structure of wood and cast sulphur-cement components, intended for use in tropical areas. There is no need for space-heating. The water supply and waste-treatment unit is separate from the rest of the structure. Cooking is solar and done outside the house.

There are a host of ecotechnology projects going ahead in Canada. It would be impossible to detail them all and still do justice. But I think it is easy to show that the pragmatic approach which Canada is using is one that will bring the most widespread, effective use of RES and the ecologically-appropriate servicing of people's needs. While Britain boasts a few pathetic solar houses on which a coterie of 'experts' seeks to survive by endlessly regurgitating this or that fact, Canada will soon have hundreds. The important thing with solar heating and the other RES technologies is that they are essentially-proven, relatively simple, and – despite the technocrats – easily understood by ordinary people. The Federal Government, acting through the State-run mortgage corporation, will award an interest-free supplement of $2500 to any intending homeowner who will install solar heating. Of course there are also specialist demonstration projects, such as the many solar houses being built as part of the Habitat 76 ten year project, on which Canada is spending $20M per year. Individual RES and ecotechnology projects, notably those at the Brace Research Institute could also be cited, but what fired me was the *acceptance* of these easily-proven technologies, and the way they were quickly and purposefully deployed.

Long-range concepts have been treated very kindly by Federal, and certain Provincial Agencies. It would be impossible to imagine a group like BRAD being given £150,000 and told to do something interesting, but the Government of Prince Edward Island has recently awarded more than $200,000 for the Ark project's buildings and hardware. The Ark is an extension of the many elegant and ecological systems that John Todd and his fellow New Alchemists, back in the less sane and safe USA, have been working on at the New Alchemy Institute. But rather than have the Ark – with its tilapia culture, biogas and solar heating – as an isolated showpiece, the Government of PEI have in addition founded by Government Act a special Institute of Man and Resources specifically to investigate the whole range of RES and ecotechnologies and communicate its findings.

In British Columbia, from late 74 until early 75, I took on a work program for the BC (state-owned) power Authority, investigating the available low energy housing systems, and setting up energy performance criteria for the Authority's building program. The reason for this was that not only did they want yer actual low energy house stuck out on some showground, but were very interested in building a series of such houses as part of their normal construction program. Later I was involved in consultancy with the Authority concerning the formation of a special division to integrate energy conservation and RES projects; after some delay this new division has now been formed, and I could well return to work in it. I have tried to interest our own Energy Ministry in such experience, but their heads seem to be deep inside storage radiators or up 'environmentally-appropriate' megachimneys. It might be argued that Canada is also very nuclear-oriented, like the UK, but this ignores the big regional variations: for example, British Columbia has a total ban on nuclear power – and with Hanford, Washington, just over the border who can blame them? Also the nuclear maximalists in Trudeau's Cabinet got a nasty shock from India's modification of CANDU side-processes, so there is now a gathering anti-nuclear force in Canadian politics, which of course greatly helps conservation and RES programs. Meanwhile Britain maintains its dubious role as the most nuclear-intensive electricity producer in the world.

Windpower is well supported in Canada. The Canadian National Research Corporation is vigorously pursuing development and production research for the vertical axis windmill design developed recently by its engineers Raj Ranji and Peter South. By the early months of 1975 a manufacturer of the blades had been found (albeit at a high cost) and there is a good chance that such mills will be widely-used, in rural areas where networked electricity supplies are expensive, by the early 1980s. At the quasi-state level, in certain specialised Institutes, there is also a lot of good work proceeding. A notable example is the Biomass Energy Research Institute at Winnipeg. Here some more of the vast differences between Canadian and British attitudes can be seen in the fact that this Institute, dedicated to biogas, cellulose-ethanol research, and related systems boasts a stunning array of State corporation chiefs, industrialists and academics on its board. It is as if the British gas-from-chickenshit pioneer Harold Bate were to set up an Institute and have the heads of a few national corporations on his board!

As a final example of the huge range of pro-environment and RES activities in Canada, I would cite the example of the Science Research Council. I briefly worked for the SRC, and came to meet many of its personnel. They impressed me deeply with their sincere interest in the future of their society and environment. This attitude is reflected by the SRC's official programs. About three major projects receive the lion's share of funding in any 2-4 year period. And in the current period the biggest project is one with the revealing title: 'Implications of a Conserver Society'. The emphasis on the program is such that thrusting young technocrats coming forward with plans for research on better aerosol cans or napalm dispensers are having to lose their prejudices – if they wish to receive funding – and to investigate what happens when cheap energy trends down, and the ecological imperatives firm up. As a little extra snapshot of Canada's energy and environment policies in action I can cite rail travel. Granted, rail is also vital to grain exports, but while British Rail passenger services seem now to be run by some backstreet minicab firm at minicab rates, Canada's nationalised CN system offers fantastic bargains such as the 3000 mile Ottawa-Vancouver trip, with sleeping accommodation, at about £35. The trains are clean, fast enough, and well-used.

Three big Jacobs wind generators dominate the domes at Robert Reines' Integrated Living Systems laboratory in New Mexico.

Amerika

The US is a staggering contrast. As an immediate example, the US has for so long shifted funds away from rail that people travel by car, bus or plane – and only in extreme circumstances take the trains that limp in, once a day, maybe eight hours late. If the social entropy of Britain could increase exponentially for 25 years, say, then things might be like the US today. Sure there are, here and there, fantastically-dedicated people working on conservation, RES and eco-technologies. But they exist in a repressive mass, a slow-motion frenzy of materialism: the US energy demand for air conditioning is equal to China's energy *for all purposes*! It is no surprise to find buildings in which the heating and air-conditioning are both jammed flat out – locked into some computerised struggle

like dinosaurs in the swamps that later became fossil fuels. Everywhere energy use and materialism substitute for human contact or co-operation: it is with such a vision in mind that the smart young British planners (who obviously had unfortunate psychological experiences in childhood) pursue their goal of a diluted USA.

For some strange reason the defence of this kind of society is taken as vital, a delusion apparently based on the belief that strange creatures, such as commies, will shortly debark their spacecraft and take away the airconditioning or refuse to pay at the drive-in eat-in. Things you say have to be carefully screened for dissenting overtones. Certain Government Agencies are automatically suspect: they are concerned with tasteless things like environment or poverty. Such Agencies therefore receive very little support, and behave in the appropriate way. I was invited to a conference arranged by the Office of Economic Opportunity in Washington, concerning the potential for communicating self-help and low cost examples of conservation and RES technologies to poor people (which America is rich in). On the conference day there had been the usual urban fun in Washington – kidnappings of some politicos – so the streets for block after block were thronged with machinegun toting police and guards. Getting to the venue was difficult – I had to account for why a non-American was in the locality, at gunpoint. And the conference itself was held in a backroom entered *through a supermarket.* People from the Agency spent a good 50% of the time anxiously discussing the possible and potential implications of anything said by the three people who with me were trying to at least say a little about what the *technologies* were like. Naturally, the implications so anxiously-sought by Agency staff were political.

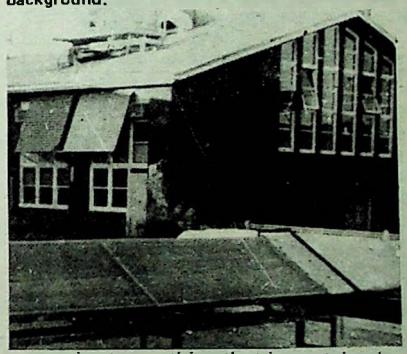
Going down south was quite an experience. It comes as a nasty surprise to realise that in the south people were beaten to death in the mid-60s for advocating mixed race occupation of restaurants, or for allowing black people to sit where they wished in a bus. Yet amidst this prehistoric scene I found groups of young people, with computer time available at their whim, who were undertaking such projects as a 'Limits to Growth'-style investigation of the impact of energy on society, using an event structure with a 200 x 200 matrix (i.e. with 40,000 first level variables). In Texas, at Austin State University's Architecture faculty, Pliny and Daria Fisk have set up the Maximum Potential Building Systems group (Max's Pot for short). Working on a UK-style shoestring they have undertaken a host of projects. And on into the desert there are the eco-freak shrines of Steve Baer's Zomeworks and Robert Reines' Integrated Living Systems Lab. Technically, I think there is plenty to admire at Steve Baer's place, but there was little that turned me on at Reines'. And at both I was turned off by the corrosive paranoia that even ran to the lengths of there being rifles in evidence. But sadly, in the circumstances, this is not surprising: hungry mega-corporations, moneygazing at profitable geegaws, have in both cases gone much further than simple aerial photo espionage in their all-American lust for other people's ideas.

California, home of refugee popstars and the world's biggest suburb (LA), is surely the America of tomorrow. No public transport, no community focusses, in the normal sense of the word, and

Ingenious motorised version of the CINVA earth block-making ram. Comprises hydraulic rams (above) recycled from a tractor with additional pieces made as necessary, linked to a dumper truck body. Can make 30,000 blocks per day.

skies – over the cities – that are a perpetual nicotine yellow. No need to smoke here, just breathe. Yet even in such unlikely venues as California little oases of sanity stand out. There are for example the study and practical centres of New Alchemy West and Sim Van der Ryn's Farallones Institute: both are concerned with teaching ecotechnologies, and R & D, in a fairly-conventional framework. And then of course there is Ken Kern, who with his friend Bob are handling a vast number of self-build projects by mail. They offer a detailed back-

Practising what they preach: low cost solar air heater used at CSIRO HQ. Collector in foreground heats complete 3,000 sq ft building in background.



up service to anything that is contained in Ken's books, and happily things are booming. Ken is also planning a 'university' or centre for self building in a relatively-unspoilt valley about 40 miles NW of Fresno. The plan is to have students do a large part of the building, and then go out to help other self-builders. Ken Kern has a real craftsman's experience in stonemasonry and building, earned over many years of simply building good: he exudes an atmosphere that gave me some hope for the future of ecologically-based communities. It was a very refreshing change to see an alternative to the flapping polythene sheets and rusting cycle wheels of so much 'alternative technology'.

I have my own theory concerning energy and society: society's organisational structures (kinship, politics, religion etc) are interrelated with the energy flowing through the society. As energy goes up, organisation goes down, *and* vice versa, to maintain stasis. America is the highest-energy society, and its practical day-to-day organisation is zero. Social entropy, feeding off cheap energy, spawns everything from Las Vegas to the Ku Klux Klan. Anything that smacks of organisation is instantly suspect, as is any kind of social activity that doesn't use a lot of energy or money (and all us energy analysts know these two are close cousins). Cheap energy *is* on the way out, even in America, despite the typical US response of shooting the odd petrol pump attendant. The storm of crises has bred thousands upon thousands of people who know that nature always wins because she plays a billion year game. Alternative, ecological, intentional and any other kind of communities – often money-poor and biased towards RES and ecotechnologies – continue to spread in the many millions of still-unused acres in the US. This America of an ecological future exists in isolated places here and there – occupied by the thousands of people whose map of the USA is the one showing areas more than ten miles from a covered road. Rather than seek plastic notoriety via the middle class media, as in Britain, they live a genuine alternativist life. They don't project above the skyline because Mr and Mrs USA have a harsh way with dissent. I was told of so many cases of random beatings and murder, many of which never get into newspapers because the local kulak militia handles the matter, that they blurred into a bad crazy mixture of *Easy Rider* plus *Fear and Loathing in Las Vegas.*

So it was no surprise to find that Oregon wasn't quite the ecological paradise that some people believe. It was, however, the first place since the East coast in which the cities did not operate a de facto curfew. It was good to see people out on the streets after dark in cities like Portland, after the grim fact of the dusk rush off the streets in places like New Orleans, Baton Rouge, Houston and Memphis. Also, Oregon says yes to pot, and no to throwaway bottles – but it has also said no to one of the best energy study teams in the world. This was the Energy Research and Planning group, set up by the ecologically-sane Governor, Tom McCall, during his reign. The group, containing people like Tom Bender, Earl Adams and others, has intensively researched the energy use of Oregon and the policy issues concerning a shift towards RES and conservation. It has backed this study with a thick list of professional, powerful videotapes and publications, aimed at communicating energy sense to everyone, from bureaucrats to truckers, from housewives to tycoons. But the mugwumps have lashed back: with a change in Government the group's messages soon became 'controversial', because what they were saying spelled unemployment after all was said and done. The US has had unemployment

of near-10% for about two years now in its white population, and maybe 35% among the blacks. Anything that appears to deny the opportunity of participating in the ransack of a subcontinent's resources very soon unlids the hysteria so close to the surface – so the energy group was spread to the winds.

New Zeal Land

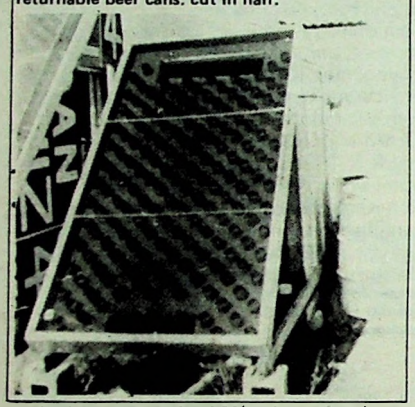
A trip to New Zealand, after the USA, is yet another banjax. Superficially it is the way so many English portray it: a visit to England of the 1950s. This however completely ignores the cultural dimension. NZ is Maori as well as white. And unlike many indigenous people whose gentleness was used as an additional weapon of genocide by Europeans in the 19th century, the Maoris fought hard, with the gun and later the court. Vast areas of NZ are wholly-owned by Maoris, with their own ritual centres in which it is illegal for a white to step. Maoris, like the Tahitians and other Polynesians are a true alternative society, their lifestyle continuously and smilingly points out that consumerism is bad for the soul. So despite the defensive ring of English-style institutions a little of their magic has permeated NZ's white settlers. Amongst the rectitude there are gaping holes of pure opportunity for those who wish to get on and get out – and live more symbiotically with nature. The Ohu scheme, under which groups containing at least eight NZ nationals are given blocks of up to 200 acres (on which they must not use chemical farming methods) is a case in point. It is not a surprise to find that the concept was originated in the Ministry of Lands, headed by Max Raita, a Maori.

The NZ economy, after a brief commodity-led boom in the early 1970s has been hit very hard by energy costs. Having no oil it is in some way similar to the UK before N Sea oil (and probably the UK of the 1990s!). But the response to energy shortage is very different: rather than bang their heads against a wall of joules, the NZ Government has set up a wide-ranging research and development programme on RES. For its first year (1974-75) $NZ800,000 was allocated for a range of projects that cover everything from biogas and windpower to solar energy, heat pumps and the localisation – or decentralisation – of grid power systems. The funding may not seem very large, but it is important to note that NZ's population is less than that of the Birmingham region; scaled up by population it would be equivalent to the UK spending about *25 times* more on RES than it actually does.

Oztralia

Australia is superficially more European-contemporary. Its big cities are big, and its Englishness is far less obvious, being purposely diluted by massive non-British immigration in the years before Australia, like NZ, called a virtual halt to immigration. Australia is an industrial state, as well as a commodity-resource exporter, thus the threat of high cost energy is a strong one. But this is diluted by the relaxed Ozzie lifestyle that can be summarised by the often-heard phrase "she'll be right" and the freak discovery, in 1964, of Australia's only major oilfield, in the Bass Strait, off Victoria. This one field has given 70% self-sufficiency, but today production is tailing off, and no new large fields have appeared. There is a distinct possibility of oil exhaustion within a decade or so. This, together with the OPEC price rises of 1973, and the adamant anti-nuclear stance of the recently-toppled labour Government and the trade unions, has stimulated work on Renewable Energy Sources. Since the sun is never far away in Australia it has been a main research target, and solar energy has crept into energy planning: by the year 2000, one-tenth of Australia's energy is expected to come from the sun. While Britain has no serious solar research centres, Australia has several. A really fine example is the one at CSIRO, in the Highett suburb of Melbourne. Bearing in mind that the energy targets for 2000 were set some years ago, and are therefore geared to something like three times today's use rate, the 10% solar target is ambitious. To do CSIRO credit, they have approached this inflated target in a highly-pragmatic, purposive way. They have helped to encourage solar heating in all Government-built housing in the northern States, and have attacked the seemingly-difficult problems of substituting solar energy for conventional sources in industry. A host of new solar energy uses has resulted – such as timber curing and process heating – and there is some good prospect for the 10% target being reached.

Low cost solar air heater at Max's Pot, Austin Texas. Collector surface comprises non-returnable beer cans. cut in half.



The 'problem' of the country's gigantic size has advantaged RES technologies in Australia. Wind energy, for example, is widely used. One case is the deployment of Pye Dunlite mills along the rail and road route across the Nullarbor Desert (Budding eco-entrepreneurs may be interested to know that these overpriced mills are sold after a few years service –, because of high upkeep costs – at about £50). As in New Zealand and Canada the wealth of available space means that those who want to can easily obtain land – and this basic resource strength has had an enormous effect on those people who, through the global grapevine, have become motivated to live close to nature.

In New South Wales I saw areas where many hundreds of young people had taken land – co-existing peacefully with local small farmers – and had then set up virtually their own market towns, with shops, education and even health services organised at a basic but effective level.

Britain has an awful lot to learn from the countries that she once called 'colonies'. This, basically, is my conclusion from what I have seen and heard during the past year. There are many secondary conclusions, and among these I think the most important is that we can also learn a lot from the way that Canada, NZ and Australia have maintained their cultural link with the natural environment – despite having urbanised economies. To pretend that Britain can go on being industrial, wealthy and unaffected by resource shortages that are destroying other over-populated nations is madness at best, and a calculated political self-delusion at worst. The stampede into nuclear energy offers no real solution: all it makes sure of is that survivors will have yet more sterilised land to put up with. It is in my view very significant that the more sincere, relaxed, and truly human governments of NZ and Australia have no plans whatsoever for deploying nuclear power stations amongst their people.

On the ecotechnology front Britain is now, as usual, the focus of the academic rather than the practical approach. Many would say that 'because Britain is poor', and so on, it cannot afford to support the Renewable Energy Sources and ecotechnologies generously. My counter-argument here is that if Britain can afford £80M per year on the single subject of fast breeder research it can surely afford to look a little harder at the life-support systems that will be obligatory by the year 2000, if not before. No doubt Britain will eventually get round to this kind of thing, but for the self-proclaimed innovators it must surely be a little humiliating to have those damn ex-colonials get there first.

Andrew Mackillop

Addresses

- Biomass Energy Research Institute, Postal Station C, Winnipeg, Manitoba.
- Brace Research Institute, MacDonald College, McGill University, Ste Anne de Bellevue 800, Quebec, Canada.
- New Alchemy Institute, Box 432, Woods Hole, Mass 02543, USA.
- National Research Council of Canada, National Aeronautical Establishment, Ottawa, Canada, KIA OR6.
- Laboratory for Maximum Potential Building Systems, University of Texas, School of Architecture, Austin, Texas.
- Zomeworks Corp., PO Box 712, Albuquerque, New Mexico 87103.
- Integrated Living Systems, Star Route 103, Tijeras, NM 87059.
- Farralones Institute, PO Box 700, Point Neyes Station, CA 94956.
- Ken Kern, Owner-Builder Publications, PO Box 550, Oakhurst, California 93644.
- CSIRO, Highett, Melbourne, Australia.

POWER TO THE PEDAL

Exercising machines, you may well think, are a symptom of the sedentary and unhealthy way of life pursued by modern urban man — part of the problem of 20th Century civilisation, rather than part of the solution. But given that a great many of us are fated to live and work for the foreseeable future in situations where the opportunities for exercise are very limited, an exercise machine, as Frank Thompson argues, has its advantages — especially if you can use it as a standby electrical generator as well. Alternative technology purists who scorn the mains as a backup supply could find such a machine useful when the cottage lights are dimming and the windmill stands maddeningly becalmed.

"The only exercise I get is when I take the studs out of one shirt and put them in another."

Bartlett's Unfamiliar Quotations.

FOR MANY PEOPLE in urban areas the above quotation contains more than a germ of truth. Exercise should be an essential part of man's activities and, although this may be carried out in recreational or other centres, an exercise machine in the home has a number of advantages:

- exercise may be taken at the most convenient time
- after the initial cost there are no recurrent costs such as admittance charges to recreational centres
- exercise is independent of the weather.

Many commercial exercisers are available, but all have one feature in common: *they dissipate energy*. Because energy conservation is important at the present time

COSTS

	£
Secondhand alternator type 17 ACR	14.24
Chains	1.26
Small sprocket (7 tooth) from lawn mower	0.50
Cycle parts (estimated)	1.00
Constructional parts (estimated)	1.00
TOTAL	£18.00

and is likely to be even more important in the future, we thought that an exercise machine which would store energy would be extremely useful. The electrical battery probably provides the most convenient method of storing energy, so it was decided to construct a machine to convert muscle power into electrical energy. The battery could then supply power to a low voltage lamp for day to day use or, if necessary, it could be connected to an invertor which would provide an emergency 'mains' electrical supply. The only design criteria adopted in the project were that the machine should (i) operate satisfactorily (ii) be cheap and (iii) be easy to assemble. Therefore we felt it was necessary to use mass-produced components (preferably secondhand) from cars, bicycles and household equipment and assemble them in a fairly simple manner.

We realise that similar projects will have been carried out previously but no data was readily available.

Design

Human energy conversion

An assessment of the rate of energy conversion within the human body is an extremely complex problem. However, from Fig.1 it can be estimated that a power output of 100 watts can be sustained by an average person for about one hour.

A secondhand bicycle was used in the construction of the machine primarily for economic reasons, but also because it is generally accepted that a person in a normal cycling position can develop a high output of mechanical power.

Electrical generation

Car alternators and d-c generators have power ratings of between 100 and 500 watts and are, therefore, compatible with the power output from the human body. A Lucas alternator, type 17 ACR, was used in the machine and a typical output characteristic is shown in Fig.2.

The advantage of using an alternator instead of a d-c generator is that the latter requires higher rotational speeds for a given output current. In addition, most alternators have an integrated control box and rectifier unit so that external connections are simply made to two terminals.

Power transmission

From the previous section it can be seen that alternator speeds of between 1000 and 2000 r.p.m. are required and, since a person can pedal at a rate of approximately 100 r.p.m., a gear ratio of greater than 10:1 is necessary. To produce this gear ratio from bicycle parts a two stage gear system is needed.

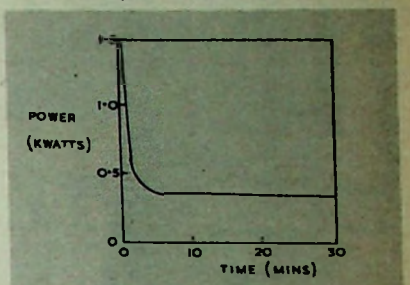


Fig.1. Mechanical Power Developed by Athletes[1].

Description

The electrical circuit and details of the two stage gear system are shown in Fig.3.

For test purposes, an ammeter was included in the circuit, but only the pilot light is necessary to ensure that the machine is operating satisfactorily. A resistor, which forms part of the circuit,

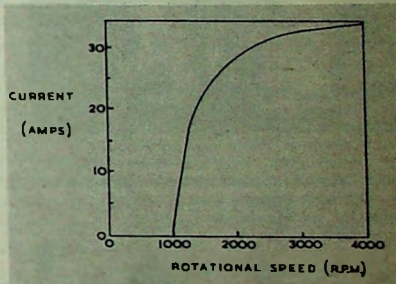


Fig.2. Output Characteristics of the 17 ACR-type Alternator[2].

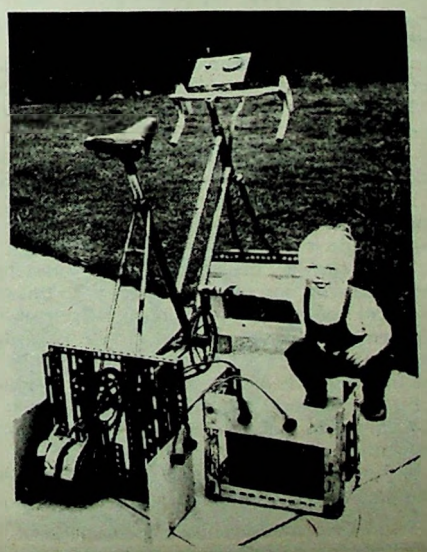
limits the charging current to about 8 Amperes otherwise too much pedal power is required. It is simply a length of heater wire with a resistance value of 0.05 ohms. The intermediate gear consists of two sprockets welded on to a bicycle front wheel bearing. A third sprocket is fitted to the alternator shaft on a special bush which was fabricated in a lathe and the fourth sprocket is the chainwheel of the bicycle. The gear ratio is approximately 19:1. The complete machine is shown in the photograph.

Operation is extremely simple. The battery is connected as shown in Fig.3(a) and this causes the pilot light to glow. The pedals are then turned at a sufficiently high rate to cause the pilot light to be extinguished and the battery is then being charged.

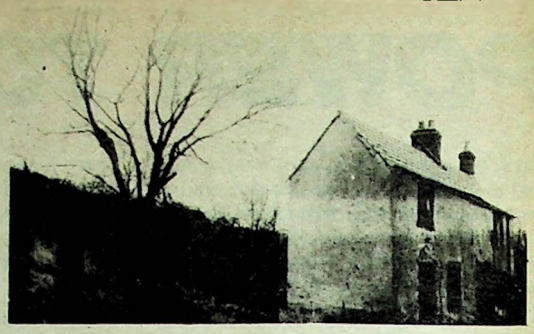
Conclusions

The exercise machine was constructed simply and cheaply and has been operating satisfactorily for some months. If

Continued on page 26

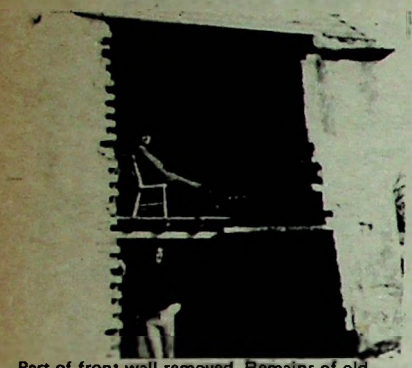


BUILDING HILLSIDE COTTAGE



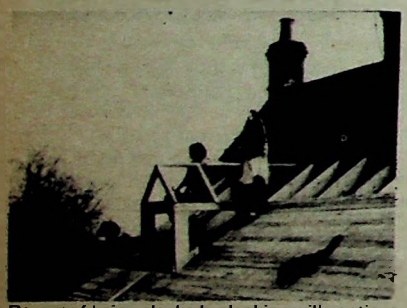
Ian Hogan

The cottage in 1971. Chimneys and front wall collapsing, lintels rotted, no floors, no drains, roof temporarily covered. Planning permission to demolish and build new house refused. Demolition order from Public Health department.



Part of front wall removed. Remains of old floor and roof temporarily supported.

Work in progress. Front wall half-rebuilt in cavity construction. Rear extension sufficiently small to require no planning permission partly-built. Old walls underpinned. Drains to 'Klargester' filtration tank installed.



Rear roof being planked—planking will continue up over renovated joists on old part of house.

Rear roof and dormer window completely planked with one-by-four inch softwood, just before wood prices doubled.

MORE THAN THREE years ago, now, we began to build a house. It's finished now, more or less. Well, actually, it'll never be finished. But we live here, it's been habitable for a year or more. It's a strange house, I suppose.

It was certainly built in a funny way, come to think of it, mostly by people who turned up, and became friends. It was often hilarious, occasionally comic-desperate. I'm writing the whole story now, just for those people who helped. A lot of that is kind of private. But the lessons we learnt, I think, may be of general interest.

The house was to be a refuge. Hidden, but kind of cock-a-snook. Self-sufficient, of course; landscape-enhancing, a disappearing act, a 'soft landing in the biosphere'. Heavy, strong and secure. It would 'harvest ambient fluxes', using wind, sun and anything else — maybe methane I thought, and wood for burning. There were no plans as such, or rather the bits of paper soon got lost. The house grew intuitively, it wasn't engineered. We rarely picked up a tape measure or spirit level. Stuff straight lines; stuff straight anything. I didn't need a plan, I had a preconception.

As time passed, I learnt, in two ways. Firstly, the engineering information began to appear, to verify or refute, certainly to quantify my hunches. Low Impact Design picked up on it. LID is the parallel story, of how we attempt to design and build for others. There are a few comic-desperate stories there too. Anyhow, the information . . . calculations for the power of sun and wind, energy costs of materials, relative desirability (or obnoxiousness) of different conventional energy sources, relative usefulness of different energy-conserving ideas and strategies, and so on, they all became available. Secondly, we learnt about building, by doing it, and about the calming influence of painstaking (pains-making) work.

It seems to me, that if you're trying to save energy — or just design a building decently in-context there's an order in which you can consider things. These are those things, in order:

- climate
- site or micro-climate
- orientation of building
- overall shape and size of building
- internal organisation of building
- building structure
- servicing systems
- behaviour of occupants

This is not necessarily complete, and it gets jumbled in any real design process, where you go through over and over again. It's not rigid, but it brings you focussing in.

Let's quickly consider these factors one by one, applied to a standard, new, urban or suburban dwelling.

For the average new house anywhere in Britain, from Cornwall to Durham **climatic** variations are usually unconsidered.

Microclimate is likewise ignored, unless intense noise is considered to be a micro-climatic factor and allowed for.

Building orientation is probably fixed by a tight site or dumb planning layout, as are the **shape and size.** (These last are also tightly cost-constrained.)

There may be a slight amount of freedom to organise the **interior** of the building, but not much.

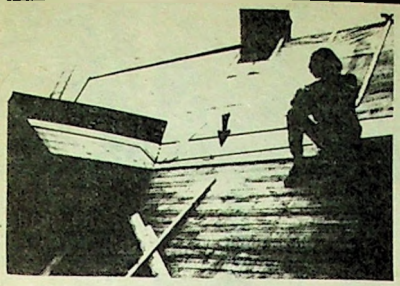
As for the **building structure,** well, a brick and concrete block cavity wall is cheap, and meets the pitiful new insulation standards, so what else can be used?

And **servicing systems** — well of necessity a system which is the cheapest to install regardless of running costs is used. Innovative technology needing higher capital expenditure is ruled out.

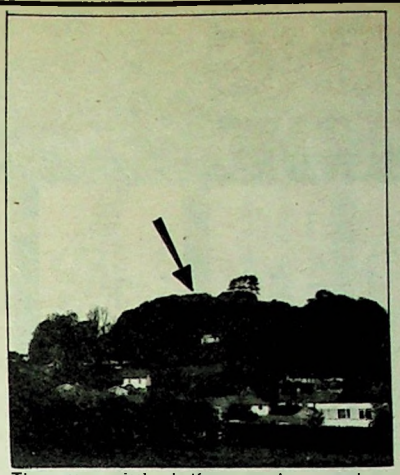
Lastly consider **behaviour of occupants:** this is tricky, and worth a digression. You see, faced with any resource scarcity (in this case a scarcity of energy, the key resource) you can fairly obviously do one or more of three things. You can reduce requirements, use the resource more efficiently, or get supplies elsewhere. The second response is the straight technologist's paradise; the third is 'alternative technology'. The first response is the only one that costs nothing.

But the suggestion that people reduce their requirements implies that their demands are higher than their real needs — which is a matter of opinion. You can't *tell* people to reduce their demands: you can only suggest.

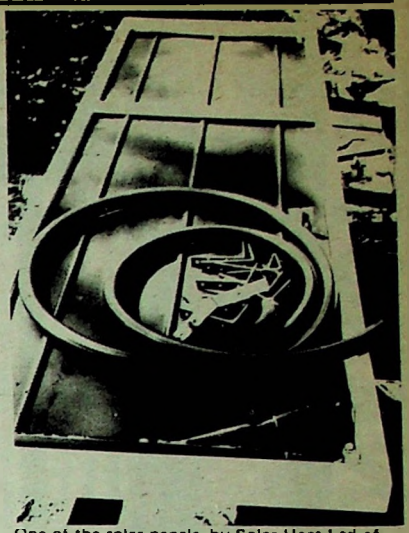
In short, when considering the factors on the list, in most (i.e. regular, 'straight') situations, we're so hemmed-in both physically and by regulations, costs, and inertia, that we can't even consider the items at the beginning of the list, or the end. And in



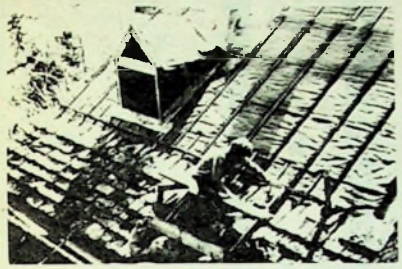
Rear roof partly lined with mylar (baksheesh) used with taped joints (but nail holes) as vapour barrier. Upper part of roof already covered with one-inch glass-wool bonded to felt, and battened down. (Photo is retouched to show the 'mylar', a highly reflective aluminium/plastic 'space blanket' which is a very effective insulant when hung in a cavity, but less useful in contact with solid surfaces, as here.)



The cottage, sitting half-way up the steep slope of the Cotswold scarp, on a south-facing spur, part of a pre-Saxon terrace system ('strip lynchets') believed to have once grown grapes. The site is exceedingly microclimatically favoured; the growing seasons are a month ahead of the valley 150 feet below, and frosts are often delayed by a month.



One of the solar panels, by Solar Heat Ltd of Birmingham. Each panel is one square metre, of copper pipe soldered to coated steel plate. Panels connect with rubber hose and jubilee clips.



Cotswold stone tiling in progress. Tiles are sorted into stacks of diminishing sizes. Largest ones go on at bottom of roof, and progressively smaller ones as work proceeds. Tiles are second hand, originally hooked over battens with oak pegs. Galvanised big-head nails now used. Notice rounded shoulders of tiles to reduce weight, and counter-battens holding tiles clear of felt below.

The last tile goes on. 4 weeks work for 4 totally untrained people. Each ideosyncratic tile told us its preferred place. Finished roof weighs about 8 tons.

the middle part of the list there's but little freedom for action.

The reasons for this stultification are not hard to find. There are I think, just three basic determinants of house form: **Economics, Culture,** and **Environment.**

Economics concerns itself with 'the allocation of scarce resources'. Keynesian economics invented living on tick, which enabled resources to be exchanged for promises – for instance, oil for paper money. That meant everyone wanted 'things'. since any state with the gall to flourish its paper money could 'pay' for 'things', and since there weren't enough things, things got short. Demand created shortages; corporate economists in a sense invented scarcity, and then gave themselves a job regulating it. This sets up the conditions for a mad scramble for tawdry uniformity. But this scarcity exists amid unperceived abundance. For instance, just about anywhere on the land surface of the earth, man can build shelter, *if he knows how.* In most places, he can dig a hole, and build his shelter with what came out of it, over it, with knowledge and a minimum of imported resources. So if we re-learn how to use *abundant* resources, in the light of new information, what need do we have for scarce resources? Not a great deal, but, well, some, to be sure. Copper, iron, and steel, plastics, they're OK, indeed indispensable used carefully, sparingly, to last.

As for **Cultural** determinism: who, knowing the convivial alternatives, could accept the Western model, the bungaloid televisual subtopian nuclear-family ideal, the quietly desperate living death? A home should be liberating, hospitable, humorous, relaxing, exciting; to withdraw within, and with which to entertain; to delight. Not an English arsehole's castle, nor a council flat, a human filing cabinet.

And **Environment** we ignore, huddled as most of us are in the carcinogenic heat-island microclimates of cities. (This is no exaggeration. Insolation is usually reduced 10% by atmospheric turbidity – muck in the air – over London. Nevertheless, London is frequently 5°C warmer than the surrounding countryside because of all the dumped heat swilling around.)

At a time when the third world is calling the bluff of the economic system, and when the social system is spontaneously crumbling, let's now consider how our environment could be allowed to reassert itself as a significant influence on the form of our buildings and our lives.

South view, showing six square metres of solar collector, roof of Double Roman claytiles, second-hand. Note woodpile, which fed kitchen stove for six weeks. Greenhouse still to be built. Old and rebuilt brick wall re-rendered, using waterproof undercoat of sand/cement (3:1) with additive, and topcoat of sieved stone fragments, lime and cement (12:4:1) which will quickly weather and grow lichen, matching old rendering.

West view. Door will eventually open onto balcony. Rear extension is 4-inch blockwork, 2-inch cavity, 10-inch 'coursed rubble' laid in sand/cement (6:1) with a squirt of Fairy Liquid for workability. Pointing to be in sieved stone/lime mix (3:1).

East view, showing 200w Winco windmill for standby lighting (retouched – it really is there!) and vegetable garden.

BUILDING WITH NATURAL ENERGY

Part 1
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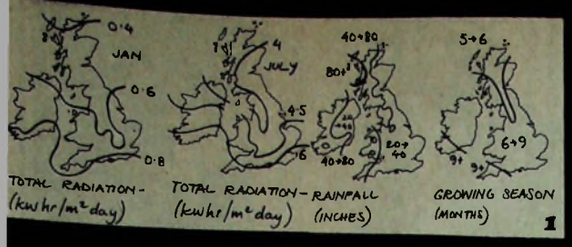
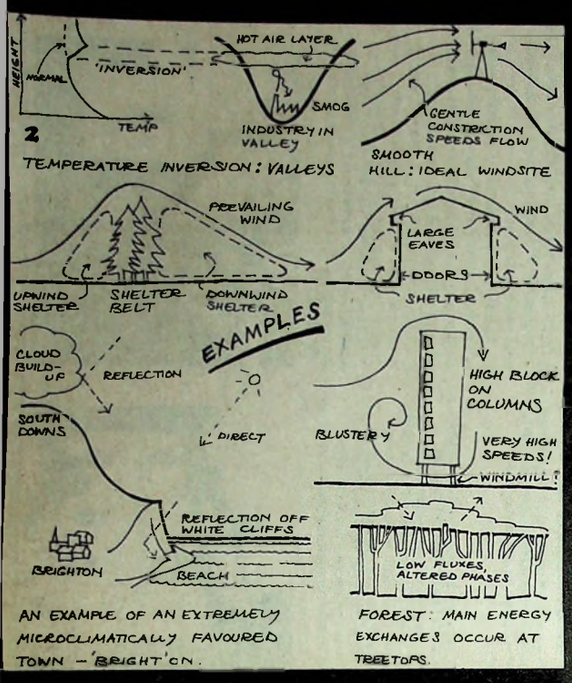
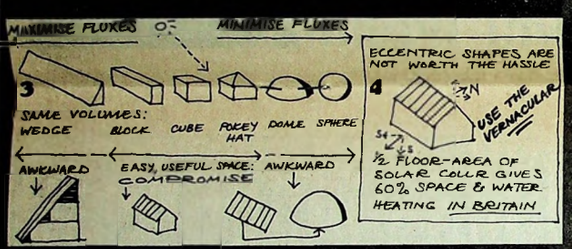
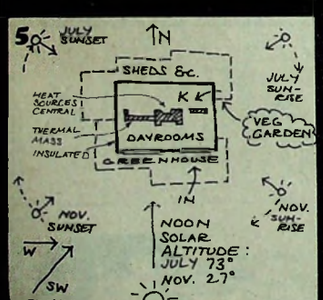
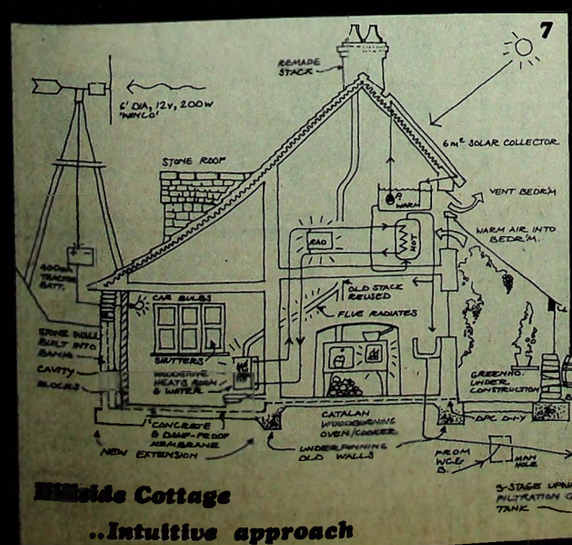










Hillside Cottage
..Intuitive approach

points to consider...

1 climate

Flows of energy are climate. A measured rate of flow, or 'density' of energy is a 'flux'. The British isles are all one climatic zone. The islands are very warm - for their latitude. (Av. 10deg.C, 50deg.F) They receive less direct solar energy (1200 hrs/annum) than almost anywhere. The Gulf Stream moderates year-round temperatures (range 13degC.-24degF). long summer hours of daylight and moderate temp give long growing season.

2 micro-climate

Microclimate is the effect of land shapes, buildings and plants on the climate near the ground, causing differences in temperature, humidity, light & wind. In Britain, microclimate is more important than climate when siting a windmill. (A 3m.dia, 5kw-nominal mill produces about 3kw on open fenland, only 1kw in suburban location.) Solar receipts too are highly variable. Filthy city air reduces insolation by up to 10%. High buildings create vortices. Cities create 'heat-islands'. Frost, fog, mist are microclimatic effects.

3 shape and size

A structure set to catch a flux presents a large surface perpendicular to it. One approach to a structure aiming to minimise a flux, is to make its surface as small as possible. A sphere has the smallest surface : volume ratio.

SOME FLUXES NEEDED
SOME UNDESIRED

4 orientation of building

Environmental fluxes are directional. Sun, of course, from South. Prevailing winds W. to S.W. But orientation is not ultra-critical. Much solar energy comes - diffused by cloud - from all over the sky - bowl. In practice, surfaces 20deg away from due S. are as good as spot-on. Likewise, although 35 deg is optimum solar collector tilt, plus or minus 15 deg is fine.

5 internal organisation

Big rooms have convection currents so they're hard to feel comfy in. Small rooms are OK for some tasks. Not all activities need total enclosure. Conservatories, greenhouses, sheds, porches, carports, lobbies are niether inside nor out. Gardening tools, bikes, fixing things, all need this kind of space. Animals need special accommodation. Enclosed space costs money. Partly enclosed space is cheaper, & shelters the heart of the building.

6 structure

Vernacular tradition provides a treasure trove of information about doing more with less. Well-built old buildings frequently perform beautifully in-tune with their environment. Sometimes they don't. The vernacular can be updated using a minumum of hi-tech.

Every house is a solar house - they all exist under the sun. Temperate houses should have:

- large south windows with quick-acting insulating shutters, to achieve solar gain.
- solid floors and internal walls to store this gain and other heat.
- high level of insulation in walls and roof (U-value 0.2 w/m.sq.deg.C., equivalent to about 7.5cm. foam.)
- controlled rate of air change - draft proofing, lobbies, even ducted ventilation, in through roofspace (pre-heated by sun on roof slates), and out through kitchen and lavatory. BUT (open fires and stoves need drafts)
- a workspace/greenhouse/porch on south wall

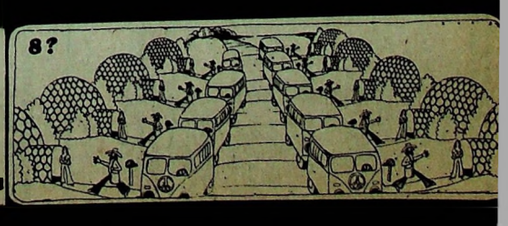
7 servicing systems

- Electrical energy should be used only for those tasks which it alone can perform - lighting for difficult tasks; high-flux short-duration applications such as motors; electronic gadgets. Consumption will then be around 1200 Kw.h/annum, and could be generated nearby or on-site from wind.
- Space heating should be Solar, backed up with (methane), wood, coal, gas, oil. (Fuels ranked in descending order of environmental acceptability.) Accept maximum temp. of 20degC., 70degF.
- Water heating likewise. Maximum temp. 50degC., 120degF.
- Cold water - could collect most reasonable volume off roof.
- Pipe wastes. Keep the good juice on the premises. Livestock may give methane-producing capability.
- Re(f)use. Segregate compost, paper, the rest.
- Cooking. Use preferred fuel, pressure cooker, haybox; eat raw, sprouted grains & legumes.

8 occupants

An environmentally in-tune house imposes some restrictions. It lifts some too. Self-building reduces costs to a third. Good design reduces running costs to less than a quarter. Dependence on money economy is reduced. (e.g. a £5000 mortgage takes £13000 and twenty years to pay off.) And ABSOLUTELY no need for nuclear power stations. Reduced need for manufacturing industry either as a supplier of goods, or as a provider of employment (so-called).

to be continued...
Part 2. With hindsight & more information.. an Engineered approach



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a complete bicycle is available the alternator unit can be substituted for the rear wheel. Alternatively, a simple support could be made so that the rear wheel of the bicycle transmits power to a roller which then turns the alternator shaft.

The cost of commercial cycle exercisers is approximately £50, compared with which the cost of the exercise machine described in this article is relatively small; as a bonus, the expended human energy is stored as electrical energy in a battery.

References

1. Adapted from Fig.20 p301 *Exercise Physiology*. Ed. Harold B Falls, Academic Press 1968.
2. *Workshop Instruction Manual* (Nov 1968) Joseph Lucas Ltd.

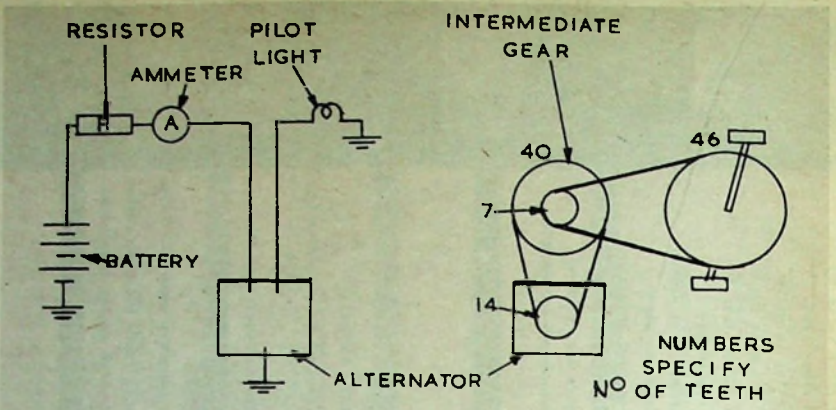


Fig.3. Details of the Exercise Machine:(a) electrical circuit; (b) gear system.

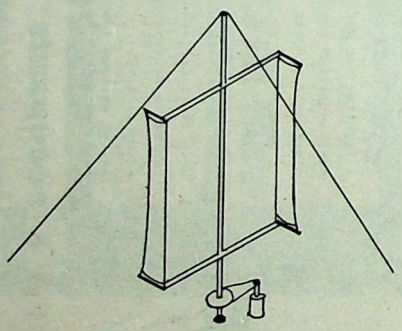
An ingenious vertical-axis windmill which combines the aerodynamic efficiency of the Darrieus rotor with the ease of starting of a Savonius rotor has been developed by Brian Hurley of the Low Energy Systems group in Dublin. The unit, which promises to be simple and cheap, yet pretty effective, was shown in prototype form at COMTEK-75, and is now being developed in the engineering department at Bolton Street college of technology, Dublin.

Brian gives the essential details of the design here, in the hope that other people will experiment with it. Feedback to Brian Hurley, Low Energy Systems, 3 Brighton Road, Dublin 6, Ireland.

HELLO SAILOR!

A REMARK OF Buckminster Fuller kept returning to me. He suggested that the most likely avenue for development of windpower would come from the study of sailing ships. The ships that come to mind immediately are sailing clippers, but it was the modern sailing yacht that offered most help in the evolution of the design.

I set out to construct a Savonius rotor from cloth using a rigid frame, without a very clear idea of how exactly I was going to build it. Another thought that was attractive was the possibility of using the wind itself to shape the vanes. The result was a rotor that worked, but was a little clumsy in operation. Further experiments led to a more elegant



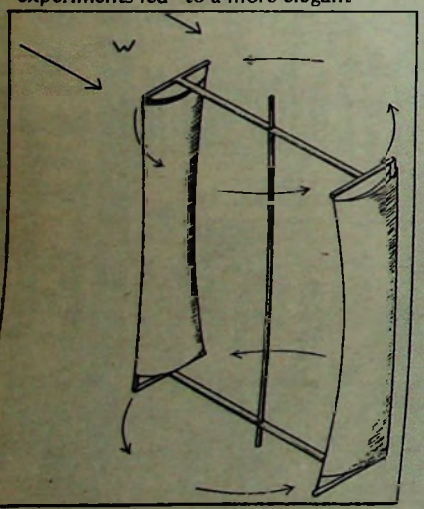
solution.

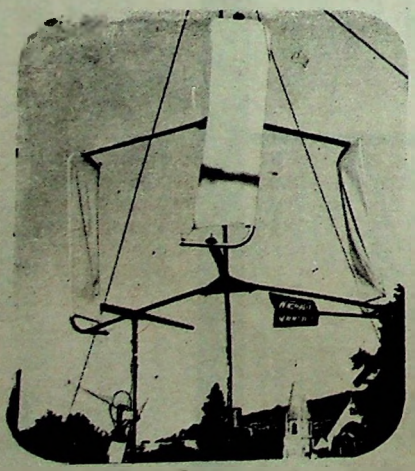
The rotor consists of two or more sailwings mounted vertically at equal distance from a vertical axis. It rotates about this axis. Each sailwing is formed from a rigid spar, which is positioned at the leading edge of the sail. To this spar two or more rigid ribs are attached at right angles. The trailing edge of the sailwing is held in tension between the ends of the spars. The surface of the sailwing is made from a cloth envelope. Other flexible material could be used.

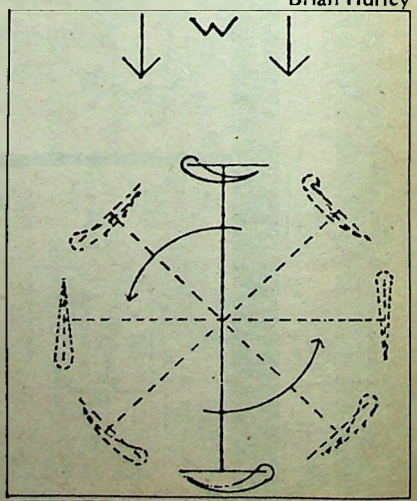
When the wind impinges on the sailwing it takes up an air-foil shape with a concave surface facing into the wind. During rotation the sailwing behaves like an air-foil with constantly changing angle of attack. During one complete revolution of the rotor the sailwing switches the concave surface from one side to the other automatically. This enables the rotor to develop a positive torque even at low r.p.m. for practically all positions of the rotor. It is self starting, unlike the Darrieus rotor to which it is similar in some other respects.

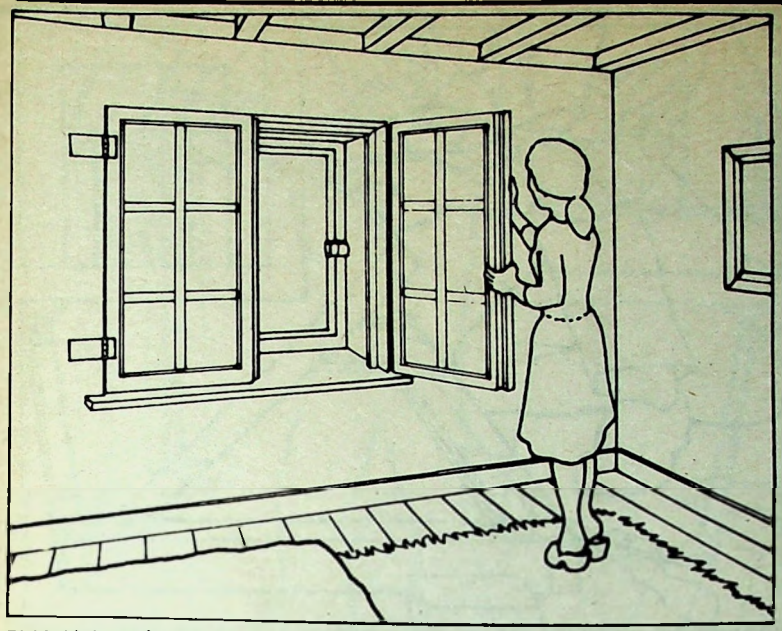
A feature which may be of importance is that the trailing edge of the sailwing shifts its position relative to the leading edge during rotation. The trailing edge is deflected to the side away from the wind due to the 'belly' developed by the sail. This has the effect of reducing the angle of attack of the relative wind. This tends to delay the stalling of the sail when the angle of attack becomes large.

Brian Hurley









Rigid side-hung shutters can be made to blend with even the most traditional interiors. Here laths have been stuck on to break up the surface.

BUTTON UP YOUR WINDOWS

It costs about £300 to create a kilowatt of electrical generating capacity using nuclear fission. To make available the same amount of power by installing domestic insulation costs only about £50 per kilowatt. The energy savings possible by insulating Britain's 19 million homes, at least half of which are not insulated at all, far outweigh the energy that would be generated, at huge economic, social and environmental cost, by all but the most lunatic nuclear power programmes.

Insulation, for the less-well-off who need it most, can often seem prohibitively expensive – even though it saves money in the long run. But John Colesby and Phil Townsend have just produced a book called *Keeping Warm For Half the Cost*[1] which tells you how to do-it-yourself, using cheap, easily-available materials where possible and avoiding all those commercial rip-offs. Here's an extract on how to make window shutters that will save more heat and cost a lot less than the double glazing you see advertised in the Colour Magazines.

THE IDEA of shutters rather than curtains, in itself, is not new.

Some old houses still retain the old fashioned heavy wooden shutters which are hinged and fold to the sides of the windows in the daytime. On the continent, one often sees louvred shutters, designed to keep out the sun and protect windows from heavy winds or storms. There are wooden versions of these on sale in this country, but these are mainly hung for their decorative qualities rather than being actually used.

The principle of insulation shutters is that rather than being a heavy expensive construction of solid wood, lightweight insulating materials, such as expanded polystyrene, are held in a frame or stuck to a sheet of plywood. When placed in position over the insides of the windows, *the insulating effect is much greater than the most efficient double-glazing systems, at a fraction of the cost for materials.* For example, double-glazed windows have a U-Value of 0.5 at best, but a 1" thick sheet of expanded polystyrene has a U-value of 0.33. To be effective the shutters have to fit well to prevent air circulating behind them. Then there is the additional advantage of a cavity of trapped air between the shutters and the glass.

Of course, insulation shutters would only be in position, and so working to save heat, during the hours of darkness – but this is when they are needed most, as the outside temperature is colder, and the heat loss is greater.

As yet we have been unable to find an insulation shutter on the market, but their construction provides a worthwhile project for the home craftsman.

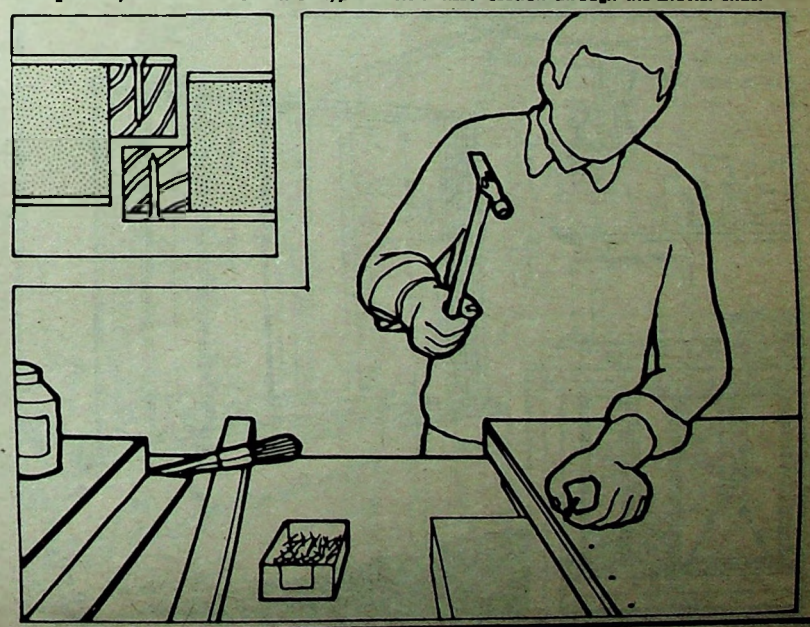
Suggestions for Construction and Fitting

There are two basic ways of making a pair of the simple rigid type of shutters – and these can be fitted wherever there is enough free wall space at either side of the window to accommodate a shutter which is half the window width (where this is not possible see Alternative Construction and Fitting methods below).

The first is where the insulation board or slab is sandwiched between two tougher layers of material; the other is where it is inserted into a timber frame. The idea in both cases is to keep the shutters flat and rigid, and to provide anchorage for hinges. They will also serve to protect the insulating material

There is a fairly wide range of insulating board or slab which might be used, but for most intents and purposes expanded polystyrene is to be recommended. It is the cheapest, lightest and most thermally efficient of all this type of insulant. [Polyurethane foam is a better insulant than polystyrene, so enables a less bulky shutter to be made with the same U-Value Value. It is also made in closed-pore – therefore condensation-proof – fire-retarding grades, specially as a building insulant. But why not recycle straw, shredded paper or egg-cartons? – Ed.]

Fixing overlap battens to a sandwich-type shutter. Inset: section through the shutter ends.



1. *Keeping Warm for Half the Cost* by P. Townsend and J. Colesby, £1.25 inc. p+p from 151 Leicester Road, Mountsorrel, Leics LE12 7DB.

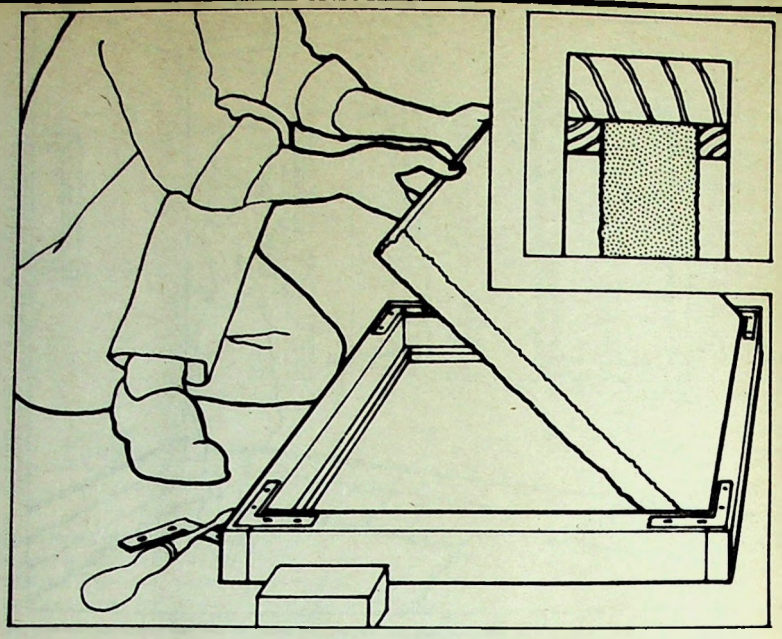
The range of materials with which it might be faced using the sandwich method is equally wide but standard hardboard or plywood should be strong enough to provide hinge points. Facing material in the framed method can be anything from a decorative fabric to a sheet of transparent plastic (when using polystyrene this will allow a subdued light to come through – even when it is an inch thick).

Sandwich Construction

First measure your window then cut your insulation board to size – this will be the window's height minus ¼" (for clearance) by the window's width minus ¾" (for clearance and for ½" central overlap battens). Now cut the insulation down the middle (top to bottom) to make the two shutter 'fillings'.

The facing material (hardboard, etc.) can now be sawn to size. You will need four pieces, two the same size as the insulation panels and two ½" wider. You will also need two wooden battens, each the height of the window and ½" by half the insulant thickness in section.

To assemble all this you will need a pot of P.V.A. adhesive (a white wood and general purpose glue) and a handful of panel pins. First give one of the pieces of insulation a liberal coat of adhesive on one side and bond it to a facing panel of the same dimensions. Then turn it over, apply the adhesive again, and stick on one of the panels which is ½" wider, leaving all the extra width overhanging on one side. The procedure is then repeated for the other shutter. When these have set the battens can be glued and pinned under the overhangs and your shutters are ready for painting and fitting.

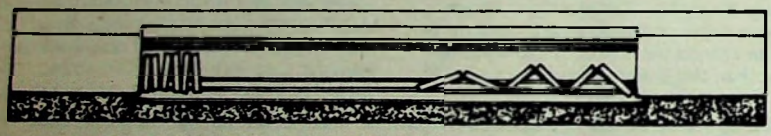


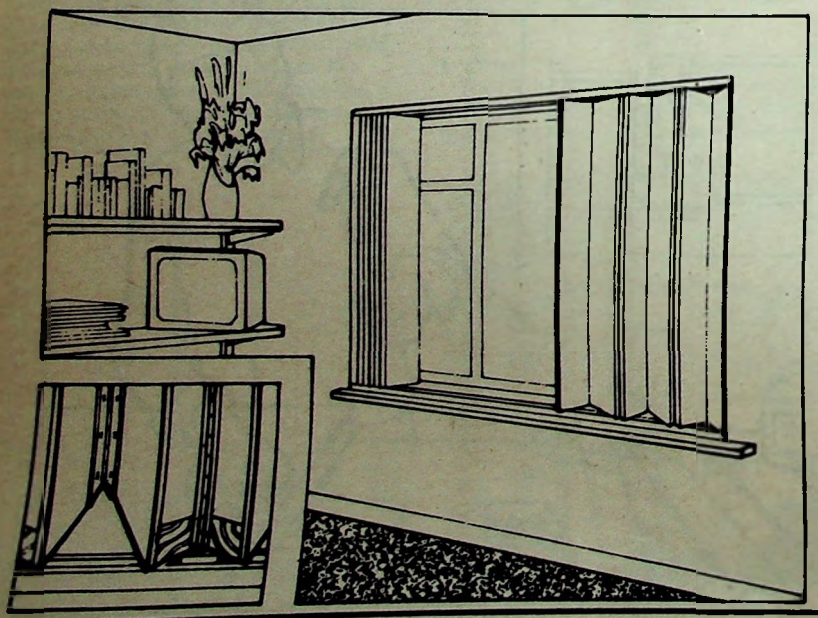
Constructing a simple frame-type shutter. Inset: section through showing beading.

Frame Construction

The timber used in framing should be at least ¾" thick (thicker for large windows) and wide enough to accommodate the thickness of the insulant plus two strips of beading. The overall sizes of the frames will be similar to those given for sandwich construction – ½" overlap battens being again used in the centre, while the panels of insulation will be smaller according to the thickness of the framing used. The corners of the frames can be half-jointed or simply butted and reinforced with brackets.

For large picture windows with little adjacent wall space, this concertina-type shutter might be used. Inset above: section down through shutters showing the tracking. Inset below: simple wooden or plastic channel track is fixed to top and bottom of the window. Solid wood strips are sandwiched at both ends to hold dowel stops which enter the track.



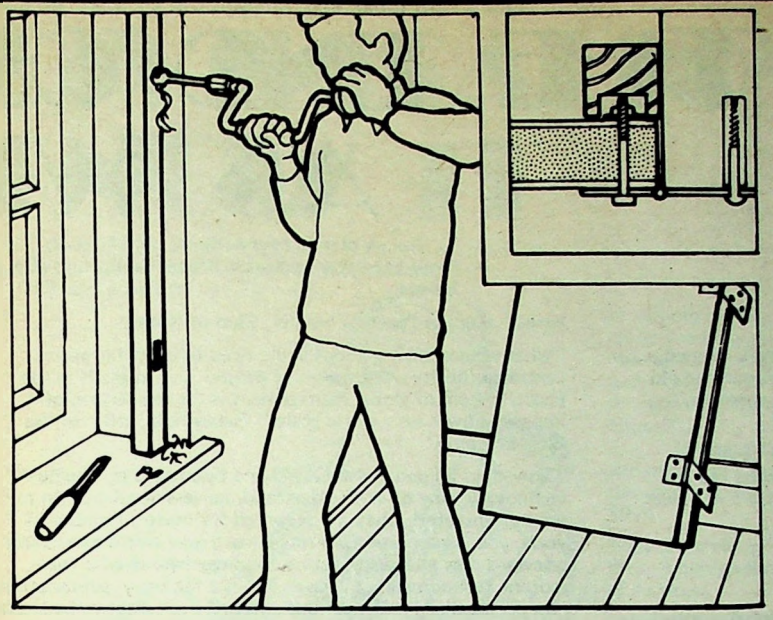


Fitting

This should be a fairly simple job providing the window surround is square and flat. You will need two pairs of stout hinges – one pair for each shutter – which will need to have a long flap on one of the sides, to ensure a strong fixing to the wall, and a shorter one which is attached to the shutters. Fix the hinges to the shutters first: they can be held by screws to the timber frame type, or by short bolts passing right through the sandwich type of shutter. Then hold the shutter in position inside the window reveal and mark points for drilling through the longer flaps into the wall. The holes are drilled and plugged – but be sure not to come within an inch of the window reveal edge or you may well crack the plaster – this is why the hinge flaps need to be fairly long. When the long flaps have been screwed in place your shutters are hung. Some form of stop will be needed onto which the shutters can close. This can simply be a batten fixed to the top and sides of the window reveal (leave the sill clear), and for optimum efficiency the edges of the shutters might be fitted with draught-stripping, all that now remains is to fit a catch to hold your shutters together and you are in business.

Alternative Construction and Fitting

It is obvious that the type of shutter referred to above will not be practical in many situations – i.e., there is often not



Making a recess for hinge bolts in shutter jamb. Inset: section through shutter end jamb showing the hinge fixing.

enough free wallspace at the sides of a window to accommodate such shutters, especially in houses with large 'picture' windows. This need not, however, prohibit the use of insulation shutters as there are at least two viable alternatives:—

1) Shutters of the sandwich type could be made up, slightly wider than the space which they're intended to fill, and cut from top to bottom into strips of an equal width which is no greater than the depth of the window reveal. These could then be hinged in 'concertina' fashion so that when opened they fit inside the reveal. They will take up a few inches of window space either side, of course, but this should be no more than the coverage of a standard pair of curtains.

Plastic piano hinge (available in black or white) could be effectively used for this type of construction, being simply glued to the edges of the shutter sections. The cost for such hinging is high, however — enough to do a concertina shutter for a window 6' wide by 4' high would cost around £8 — but the materials cost for this kind of shutter should still be no more than half that of even the moderately priced D.I.Y. double-glazing kits.

In order to prevent the shutters from waving about and becoming damaged, and to give extra support and ease of opening and closing, it is recommended that the shutters run in some simple plastic or wooden U-section tracking. This should be fitted to both top and bottom of the window reveal. Some kind of peg will need to be inserted into the ends of the shutter pieces so that they run in the tracking. One way of providing this is to fit a solid wooden strip into both ends of the shutter sandwich which can then be drilled to take dowel pegs which are glued in place.

2) A very simple solution to the whole problem would be to make up one large shutter to cover the whole window and hinge it from the top of the window reveal so that the panel raises to the ceiling when not in use during the day. There are various ways in which the shutter might be upheld but probably the neatest solution is to use magnetic catches which can be obtained with sufficient strength to hold quite heavy shutters. To do this you will need to:—

a) Fix to the ceiling joists a batten with a correctly angled face — this will hold the metal plates to which the magnetic catches stick.

b) Fit a mortice-type of magnetic catch at either end of the shutter (or, if the shutter is quite small, a centrally placed single catch will probably be sufficient.) Be sure the strength of the magnets is more than adequate to hold the weight of your shutters.

c) Fix two more metal plates (which can be cut from any thin steel) to the sill of the window — these will contact with the magnetic catches when the shutter is closed.

d) Finally, two round-eyes can be screwed to the centre of the shutter — one on each side, and a pole-hook made up from a cup hook and a broom stale. These will provide the means for unlatching, lowering and raising the shutter.

Though such a shutter might look out of place in some houses, it could readily be made a feature of the room — e.g. by facing with posters, decorative fabric, etc. [Or old copies of *Homes and Gardens!* —Ed.] — in a more adventurous home.

This top-hung single shutter is easily constructed and installed. A batten is screwed to the ceiling joists to hold a metal plate for the magnetic mortice catches which are let into either end of the shutter. Inset: The shutter is lifted and lowered using a hook screwed into a pole-end which engages screw eyes in the shutter's lower edge.

Due to circumstances beyond our control, we present

THE END OF AS WE

A play in four acts.

- *Brought to you by* Multinational Companies *(US, ECC, Japan)*

Prologue

"The continued existence of life on this planet now depends upon the conscious actions of man. Having destroyed the old unconscious process, he must become the new controller." **Harry Rothman** *Murderous Providence*

"The control of technology is therefore now the central political question that cannot be separated from the old and continuing debate about the distribution of wealth and power in every country in the world." **Tony Benn**

Introduction

The Dream

"Since the impact (of technology) tends to be global, control and management of technology are likely to be effective only if they can be organised on a world wide scale." **Francise Hetman** *Society and the Assessment of Technology* **OECD.**

"If effective measures are to be taken in time, we need something new – and we need it speedily – a global authority with the support and agreement of governments and of other powerful interests . . . ." **U. Thant, U.N. (1970)**

"The toughness of the environmental problems must be matched by toughness of the remedies . . . . The unprecedented situation of a man-made global environmental crisis requires unprecedented political action." **L. Caldwell** *In Defence of Earth.*

Act One – Global Control

Scene One – Compromise

"Building on society as it now exists, it should be possible to invent institutional arrangements that would enable man to cope globally with the consequence of his unecological behaviour . . . . In devising this structure, it would be prudent and practical not to disturb existing institutional arrangements more than necessary." **L. Caldwell** *In Defence of Earth.*

Scene Two – Enter the Godfather

"Multinational firms have exhibited no great enthusiasm for a co-ordinated approach by sovereign states to the problems that the states addressed individually in the past. They have survived in an unco-ordinated world and presumably can continue to do so." **Raymond Venon** *Economic Sovereignty at Bay.*

"For some (multinationals) the present system shows positive advantages . . . . . Some companies play off rival states against each other in an attempt to minimize costs (taxes) of the protective services they receive." **R. Murray** *Multinational Enterprises.*

". . . . the power of the multi-national Corporations exceeds that of many nation states and governments can often no longer effectively safeguard the interests of their citizens against possibly harmful decisions of their corporations." **F. Hetman OECD.**

Scene Three – Rethink

". . . . the urge to dominate is integral to business . . . . . Business is always on the lookout to control the environment, to eliminate as much risk as possible." **H. Magdoff** *The Age of Imperialism.*

". . . . . I think there would simply be a rethinking among the decision makers towards taking responsibility for the long-term development of the economy or society on a global basis." **Aurelio Peccei, Founder, Club of Rome.**

"What we are talking about is the need to exert far more central authority over masses of people . . . . implicit in the Peccei system of global management is the reassertion of imperial power on a world scale." **Schonfield, critic of the Club of Rome.**

"Nowadays all peoples are awed and fascinated by the new technology they do not understand, far less dominate. In my opinion therefore, they are prepared for quite a number of years, and on condition, to recognize a new world moderator or even a new authority, set up by those who master the esoteric technologies . . . . even if it is a far away, supranational non-personalized and vicarious authority . . . . Let us be brutal for a moment. Once they . . . reach an agreement among themselves they have the power to impose it and there is no other alternative for the vast majority of the other people but to accept it." **Peccei** *The Chasm Ahead* **1969.**

Act Two – The Club of Rome

Scene One – Enter the Philanthropists

". . . . . a group of world citizens, sharing a common concern for the future of humanity and acting merely as a catalyst to stimulate public debate, to sponsor investigations and analyses

of the problematique and to bring these to the attention of decision makers." *The Club of Rome – the New Threshold* **1973.**

". . . . more powerful and comprehensive tools of communication and conviction than those now used were necessary if world public opinion and policy makers were to be moved . . . tools which would reflect the inherent complexity of the message the Club of Rome wants to put through and yet have a strong, lasting impact on peoples minds. Professor Forrester of MIT . . . . thought that he could forge one such tool by upgrading his system dynamics techniques . . . . His proposal was accepted, the Volkswagen foundation generously made financial provisions for the project and a team of scientists under the leadership of Professor D.L. Meadows was constituted." **Peccei, Siebker** *Limits to Growth in perspective* **1972.**

Scene Two – The Worm Turns

". . . . in spite of its *a priori* political non-commitment, the Club of Rome is becoming more and more explicitly political as to the themes and objectives of its projects and official

CIVILISATION KNOW IT

- *Produced by* Monopoly Capital, *from a script by the* Club of Rome, *from the book by* Dennis Meadows.
- *Technical advice by* Jay Forrester.

meetings and also in a fundamental and conceptual sense." **M. Siebker** *Futures* **1975.**

"Many of the individuals who are members of the Club of Rome are unusually powerful in world systems: they exercise power upon large social systems by acting through industrial/corporate socio-economic and international structures, in which they are executives . . . . many possess considerable authority and are tremendously influential upon even larger groups of people and organisations." **Editorial Introduction to** *The Club of Rome – the New Threshold:– Technological Forecasting and Social Change* **1973.**

". . . . the Club is now engaged in some *public* acts of persuasion . . . ., in *other* activities that involve its members and which may influence the whole world, relative secrecy continues to prevail." Editorial Intro. *op. cit.*

of all political systems. Their strategy is the typically technocratic one of shaping policy through what is claimed to be objective and scientifically based expertise, with scant sympathy or patience with what they see to be irrational political processes which need to take account of political support and opposition . . . .

". . . . (ultimately), theirs is a strategy for increasing control and order over the economic resource problems with which the corporations are faced." **S. Cotgrove** *Ecology and Utopia* **1974.**

They are seeking ". . . a more effectively managed central state, a benign form of capitalism." **J. Ridgeway** *The Politics of Ecology.*

although because "these people consider themselves to be entirely pragmatic" they can become ". . . . servants of the ruling class at present in power." **Enzensberger** *A Critique of Political Ecology* **New Left Review 1974.**

Act Three – The Spoils of global exploitation

Scene One – Pollution

"At the heart of the ecology movement is the pollution control industry." **Ridgeway.**

"Industrial protection of the environment emerges as a new growth area, the costs of which can either be offloaded on to prices, or are directly made a social charge through the budget in the form of subsidies, tax concessions, and direct measures by the public authorities, while profits accrue to the monopolies." **Enzensberger.**

". . . . according to the American Council of Environmental Quality, at least $1,000,000 is pocketed in the course of the elimination of $3,000,000 worth of damage to the environment." **Ridgeway.**

"The new pollution-control industry looks to a 20% growth annual over the next five years, and counts on a $25 billion market." **Ridgeway.**

Scene Two – Oil

"The 'oil crisis' was more a preventative measure to fend off a greater crisis threatening the whole system of capitalist energy and raw material and economy than a constituent element of the capitalist crisis which is now sharpening . . . . . One cannot discount an element of conscious planning in this crisis." **Gaitner** *Science Bulletin* **1975.**

Scene Three – Noises off

". . . . . its members claim to be above politics and independent of any ideology, directing their appeal to the decision makers

". . . . we can only rejoice that the oil crisis happened towards the end of 1974 and not after 1984." **Pestell,** *executive committee member, Club of Rome, Volkswagen foundation, NATO Science Committee delegate.*

"British Petroleum's recently-announced £295 million profit for the first quarter of 1974 is nearly seven times greater than for the same period a year ago . . . . Shell turned in a £319 million profit in the first quarter against £114.7 million for the 1972 quarter. . ." *Guardian* 1974.

"The great increases imposed by the multinationals are justified by reference to the findings of the MIT study . . . . and the Club regards the oil crisis as the most emphatic confirmation of its warnings." **Gaitner** *Science Bulletin.*

Scene Three – The future

"The energy crisis is extending (the oil companies) power as they ensure their control over other sources of energy." **CIS anti-report** *The Oil Fix.*

Act Four – Finale

Scene One – Reprise
Conspiratorial Denouncement

". . . . during the decade of the sixties, the international economic and many-national financial systems became increasingly unstable and = the systems by which the advanced countries control and dominate the underdeveloped countries grew more and more fragile . . . . at the same time as (and in some cases as a result of) this the multinational firms were becoming more and more significant in the international and national economies.

"These increasing instabilities and uncertainties made the economic environment more threatening to the multinational firms themselves . . . .

"As a result of this, the Forrester and Meadows 'scientific' studies were commissioned as 'tools of communication and control' to operate the 'transmission pulley' of public opinion in order to force the governments of the industrialized societies to institute a 'new world moderator' (with 'stern rules about voting') which would have sufficient power to stabilize the international economic situation and insure a constant supply of raw materials." *Malthus, Multinationals and the Club of Rome,* **R. Golub and J. Townsend 1975.**

"When the enemy is nature . . . rather than another social class, it is at least imaginable that adjustments (by the capitalist and managerial classes) could be made that would be impossible in ordinary circumstances." **R. Heilbroner** *Capitalism and Socialism.*

"The power structure, consciously or unconsciously aided by propagandists like the Club of Rome, is engaged in a 'doom-mongering' programme to soften up public opinion so that they will accept cut-backs, wage restrictions, and the other fruits of the crisis of capitalism. At the same time, in view of the impending resource crisis, the powerful are seeking to

ensure that they can manage the situation and further turn it to their own advantage. So they are using the fear of the environmental crisis as an excuse for introducing for global economic and political control and planet wide centralized co-ordination of industrial activity. The eco-crisis is thus being used to re-inforce and legitimise the status quo." **D. Elliott.**

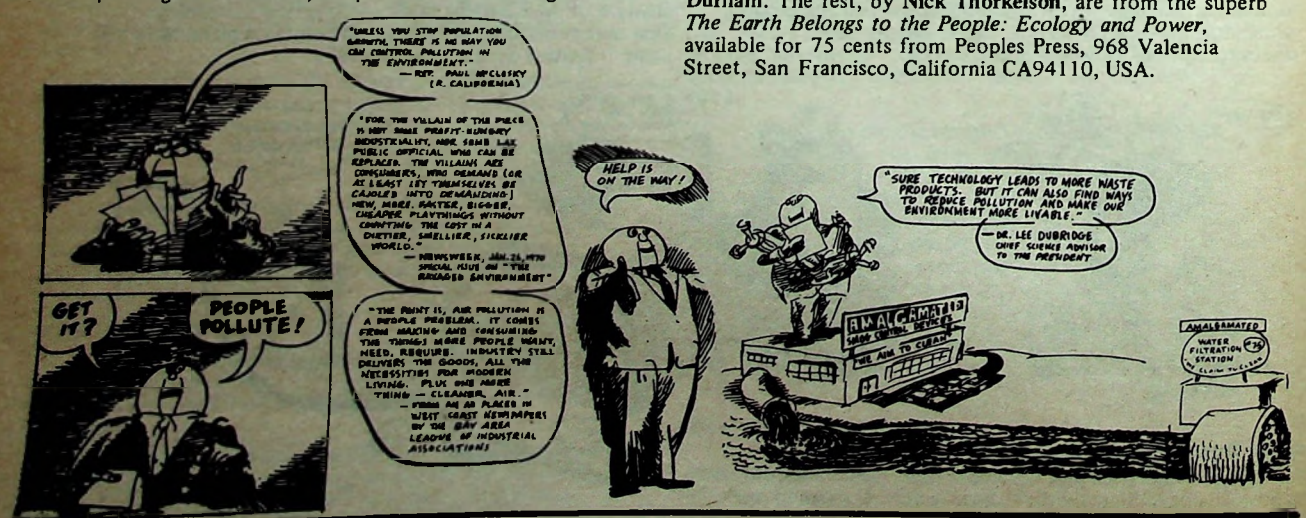
Scene Two – Finale

"MIT were after me. They wanted me to help them rule the world." **The Beatles in the Film** *HELP.*

Epilogue

"The collapsing western culture is responding to its rapidly declining resources and spiralling pollution problems by calls for global control of the biosphere. This begins with global monitoring, but cannot stop before it reaches the idea of global ecological management. Though motivated by good intentions, this movement represents bad ecology. It threatens to further centralize man's place in the biosphere and to further broaden the gap between 'expert' and 'citizen'. **Lancaster University, Department of Peace and Conflict Research, 1974.**

THE END OF CIVILISATION AS WE KNOW IT was assembled by **Dave Elliott.** Some drawings were by **Tony Durham.** The rest, by **Nick Thorkelson,** are from the superb *The Earth Belongs to the People: Ecology and Power,* available for 75 cents from Peoples Press, 968 Valencia Street, San Francisco, California CA94110, USA.



Alternative Technology in India

A K N Reddy

THE TECHNOLOGICAL ROOTS OF INDIA'S POVERTY

OVER TWENTY-FIVE years of industrialisation since independence have only accentuated the sharp polarisation of Indian Society into haves and have-nots as has been dramatically revealed by figures on the increasingly skewed distribution of incomes and expenditure. The pattern of industrialisation adopted since independence has led to a *dual* society; a society of the top 10 per cent, the elite, which includes, apart from industrialists, businessmen and feudal landlords, politicians, bureaucrats, civil servants, rich peasants, professionals like scientists and engineers, and the bulk of organised white-collar labour; and a society of the bottom 90 per cent, consisting mainly of the rural poor.

The elite runs virtually all political parties, and therefore largely controls the political decision-making machinery, with so-called 'politics' having become equivalent to wrangles between various sections in this elite. The market economy, the social services and the educational system are all almost wholly dominated by the top 10 per cent, leaving the poor (and in particular the bottom 40-50 per cent) in abject poverty with regard to essentials, goods, services and knowledge.

In addition, the polarization into a dual society is associated with the evils of rural stagnation and impoverishment, of massive rural unemployment and under-employment, of mass migration to the metropolitan centres, and of chronic balance-of-payments difficulties. Instead of the benefits of industrial growth diffusing to the countryside and reducing income disparities as was expected – the growth of industries of the type set up thus far has only accentuated the above-mentioned evils of a dual society.

The technological basis of India's predicament lies in the fact that its pattern of industrialisation has been based entirely on the technology of the advanced countries introduced through over 4500 foreign collaboration agreements. Western technology, which was designed to meet the resource endowments of the advanced countries and the interests of their ruling groups, is a capital- and energy-intensive technology designed primarily to reduce labour, to supply vast markets and to produce goods for individual consumption.

When capital-intensive, labour-saving Western technology is introduced into a country like India in which capital is scarce and manpower is plentiful, the available capital tends to concentrate in large urban plants and shy away even more from the rural economy, and the growth of employment becomes increasingly restricted by the capital-intensive metropolitan sector. The result is a sharpening of the contrast in living standards, opportunities and outlook between the urban rich and the rural poor. It is Western technology, therefore, which has buttressed the polarisation of Indian Society into a duel society.

THE NECESSITY OF ALTERNATIVE TECHNOLOGIES

The above description of the impact of Western technology constitutes the case for a totally different pattern of technology. The features of this alternative technology must be derived from an alternative strategy of development in which the starting point is the following set of facts:

(1) 80 per cent of India's population lives in the villages;

(2) 60 per cent of the population has a per capita expenditure of less than one rupee per day; and

(3) about 20 millions are unemployed and about 200 millions are under-employed.

Since the average Indian is an unemployed/underemployed poverty-stricken villager, the satisfaction of his needs demands a strategy based on

(1) employment generation in rural areas;

(2) a dispersal of mini-production units to the countryside; and

(3) the production of inexpensive goods of the mass consumption variety.

Such a strategy of development has important technological implications. In particular, the recommended pattern of growth compels and demands that preferences must be exercised in the choice of technologies. Some of these preferences (which are all designed to emphasise rural development) are listed below:

(1) a preference for capital-saving and employment-generating, rather than capital-intensive and labour-saving, technologies;

(2) a preference for cottage-scale and small-scale, rather than large-scale, technologies;

(3) a preference for the technologies of goods and services appropriate for mass consumption, rather than for individual luxuries;

(4) a preference for technologies requiring little skill, or small modifications in the skills of traditional craftsmen like potters, weavers, blacksmiths, carpenters, cobblers, tanners, oil millers, midwives and medicine men;

(5) a preference for technologies using local materials, rather than materials which have to be imported from aborad or transported from distant parts of the country;

(6) a preference for energy-saving, rather than energy-intensive, technologies;

(7) a preference for locally available sources of energy such as the sun, wind and bio-gas;

(8) a preference, in the machine-tool

sector, for the technology of mass producing scaled-down, dispersable, miniaturised factories, rather than the technology of mass producing consumer goods in gigantic city-based enterprises;

(9) a preference for technologies which promote a symbiotic and mutually reinforcing, rather than parasitic and destructive, dependence of metropolitan industry upon the rural population;

(10) a preference for technologies based on rational sustained use, rather than indiscriminate rapid devastation, of the environment.

Technologies displaying the preferences listed above are what may be termed *alternative technologies*, or more specifically *inequality-reduction technologies*. The use of the latter term not only emphasises unambiguously the key objective of these technologies – an objective which has not been and cannot be furthered by Western technology – but also provides a clear-cut criterion in the choice of technologies. The crucial question is whether any proposed technology is oriented towards the villages or the cities, whether it will reduce or increase the inequalities prevalent in Indian Society, and whether it serves those below the poverty-line or the elite.

THE CHOICE OF TECHNOLOGIES

In the case of each decision involving a choice of technology, the economics of the various options must be analysed. However, one must avoid two possible mistake in this process.

The first involves the uncritical acceptance of thumb-rules which may be perfectly true in developed countries, but can be shown to be patently false in countries like India. For instance, economists and engineers consider it to be axiomatic that the unit cost of most products goes down with increasing scale of production. This implicit faith in economies of scale has resulted in the installation of larger and larger plants. In India, however, the chronic shortages of raw materials, spares and power, the acute difficulties with the transport of raw materials, and products, the frequent labour and maintenance problems, and the cumbersome government procedures and controls, all result in industries rarely working at full capacity. This under-utilisation of capacity destroys economies of scale, and the unit cost may well be higher in a large-scale capital-intensive labour-saving industry than in a small-scale capital-saving employment-generating industry.

The second mistake is to base the economic analysis on private-sector techniques of investment appraisal which are confined to the consideration of financial returns and cash outlays, ignoring the question of social costs and benefits. One has to employ social cost-benefit analysis techniques. However, money costs and prices may have to be avoided because:

(1) capital obtained from nationalised banks and financial institutions is cheaper than it really is on the open market;

(2) labour often appears more costly than it really is because the real cost (so-called 'social opportunity cost') of employing hitherto unemployed workers is nil, a consequence of the fact that society is not foregoing any production in withdrawing him from what he was previously doing (viz. nothing); and

(3) the cost of foreign exchange obtained through the Government is less than the international market rate.

These cost distortions make it rational for private and autonomous public enterprises (which largely see the issues only from the narrow viewpoints of their own undertakings) to choose a type of technology that uses more capital and foreign exchange and less labour than would be in the best interests of the country. Hence, the cost-benefit analysis for the choice of technology is best based, not on market prices, but on so-called 'shadow prices' which reflect the policy-maker's best estimates of the real costs of capital, labour and foreign exchange from the social point of view.

A PRACTICAL EXAMPLE

Very often, however, even without subtle shadow-pricing techniques and elaborate social cost-benefit analysis, the case for alternative technology in a particular sector of industry turns out to be quite straightforward. Consider, for example, the case of fertilizer which can be produced synthetically from oil or coal, or organically as stabilised sludge from the anaerobic microbial fermentation of sewage and cattle wastes. Ruling out oil-based fertilizer plants in view of the total inadequacy of crude from indigenous production and the rapidly escalating price of imported crude, one can compare the production of 230,000 tonnes per annum of nitrogen in large-scale coal-based fertilizer plants of the type being planned in India, and in village-scale bio-gas-fertilizer plants (see Table 1).

Small-scale methane generators and fertilizer plants are the key to progress without massive disruption of lifestyles.

It is obvious from Table 1 that the adoption of the alternative bio-fertilizer technology instead of Western coal-based fertilizer technology will

(1) result in the dispersal of production to 26,150 villages, rather than concentrating it in one centre which is either urban or becomes urbanised;

(2) save Rs.130 millions of precious capital in a capital-poor country;

(3) conserve Rs.600 millions of foreign exchange in the midst of a balance-of-payments crisis;

(4) yield a much higher rate of return on investment;

(5) generate 130 times more employment;

(6) provide employment to the rural poor rather than the urban elite;

(7) generate energy instead of consuming it;

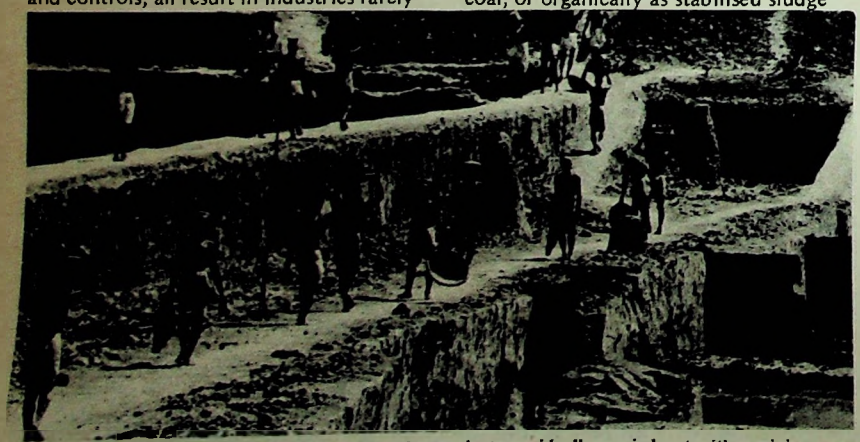
(8) produce fertilizer where it is consumed, and therefore relieve the burden on the struggling transport system;

(9) reduce unnecessary overheads on marketing and advertising;

(10) protect the villagers from the private and government apparatus set up to take fertilizer from the urban factory to the village consumers; and finally

(11) promote village self-reliance.

This example shows clearly, in capsule form, why the choice of Western technology wastes capital and concentrates it in the metropolitan sector, squanders foreign exchange and energy, drastically inhibits rural employment and puts the villages at the mercy of the cities. Such choices



Labour is India's major resource. Civil engineering projects are ideally carried out with a minimum of machinery.

	Western Technology (Large-scale coal-based fertilizer plant)	*Alternative Technology* (Village-scale 5000 cft/day bio-gas-fertilizer plant)
Number of plants	1	26,150 (@ 8.8 tonnes per year per plant)
Capital cost	Rs.1200 million	Rs.1070 million (@ Rs.41,000 per plant)
Foreign Exchange	Rs.600 million	nil
Capital/sales ratio @ Rs.4350 per tonne nitrogen	1.20	1.07
Employment	1000	130,750 (@ 5 per plant)
Energy	about 0.1 million MWH per year *consumption*	6.35 million MWH per year *generation*

Table 1. The Production of 230,000 Tonnes of Nitrogen per Year by Western and Alternative Technologies

repeated several thousand times are responsible for India's present predicament.

THE ADVANCED CHARACTER OF ALTERNATIVE TECHNOLOGIES

The example of bio-gas-fertilizer plants illustrates another important aspect of alternative technologies – viz., the level of science and engineering which must go into their development. The point is that these bio-gas-fertilizer plants must be tailor-made for Indian village conditions, where skills are scarce and infra-structural facilities such as electricity are often lacking. Western designs cannot be copied slavishly because they incorporate the usual preferences for capital-intensive, automated, skill-demanding, synthetics-based, large-scale solutions.

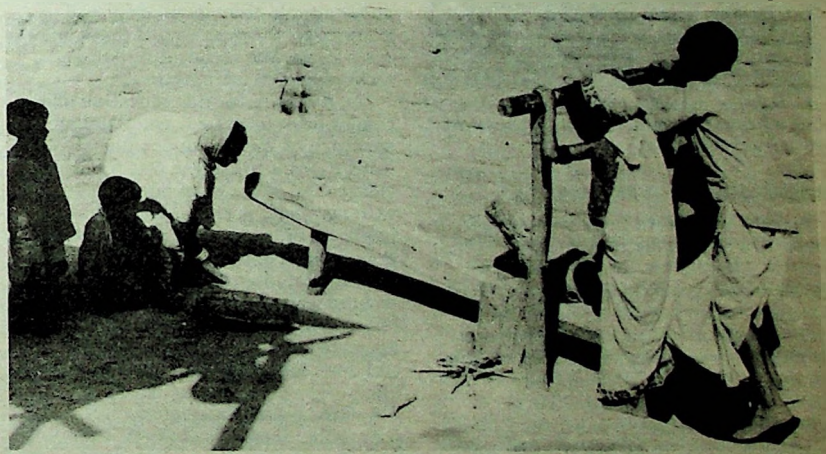
Thus, bio-gas-fertilizer plants dispersed in Indian villages must not include main and auxiliary equipment requiring sophisticated controls and subtle maintenance procedures. Plant fabrication should as far as possible be wholly accomplished with the skills and materials available in a village, so that the crucial activity of maintenance can be achieved without urban engineers. All these factors impose stringent constraints on the design, which would, therefore, require the team work of microbiologists, chemical engineers, mechanical engineers and materials scientists.

The general conclusion is that 'alternative technologies' are certain to be 'advanced technologies', if the 'advanced' character of a technology is to be judged not from the trivial criterion of scale but from the sophistication of the scientific and engineering thinking that goes into it. Thus the demand for new approaches to production engineering based on minimising capital, energy, scale and skills cannot be satisfied without a mastery of engineering. And, if product quality is to be ensured, one cannot just adopt the quality control procures developed in the West because these measures have been specifically designed for large-scale industry. It is vital therefore, to evolve radically new quality control techniques compatible with decentralised, small-scale production, involving people with less skill than in the developed countries. Again, an emphasis on locally available materials requires advances in the science of many materials (coir, bamboo, bagasse, etc.) that are not commonly used in conventional Western technology. New applications of materials science (e.g. jute-reinforced composites) are required.

A MICRO-APPROACH TO ALTERNATIVE TECHNOLOGIES

As the realisation has grown that a major thrust towards inequality-reduction technologies is unlikely to be made at the national level, a number of committed groups have sprung up at the institutional level to develop these technologies. Unfortunately, commitment is only a necessary, but not a sufficient, condition. Competence, too, is required, particularly because 'alternative' technologies cannot be – as they often are – confused with 'low' or 'primitive' technologies.

Only the major institutions (universities, research institutes, national laboratories and institutes of technology) possess the multi-disciplinary competence to tackle the task. Unfortunately, however, extremely few of these institutions have interested themselves in the challenge.



A traditional rice-threshing device involves the whole family. It is both work and play for the children.

This failure is essentially because it is from alien soils that these institutions derive their emerging areas of research, their trends and fashions, and their stream of ideas and inspiration. No wonder that alternative technologies are not viewed as professionally glamorous enough to merit attention.

At the same time, however, these institutions have been engaged in a desperate quest for relevance – but this relevance has thus far been almost universally interpreted to mean relevance to urban problems and Western technology. The possibility of relevance to rural problems, wherein lies the raison-d'être of alternative technology, has been scarcely considered.

Faced with this unconscious boycott of the rural scene by established institutions of science and technology, attempts are being made to set up institutes of appropriate technology and rural development. This is hardly a solution to the problem, because the number of disciplines required to make such institutes function effectively is so large that the inevitable result will be additional institutes of science and technology with a whole paraphernalia of extra staff and services.

Further, once particular projects are completed, it may turn out that most of the expertise assembled for those projects will become redundant. A far more effective approach is for functioning institutes of advanced study and research to initiate and promote work in alternative technology, particularly as applied to village development. Such a redeployment of efforts with existing infrastructures is a more economical measure from the point of view of the country.

It is within the above context that one must view the attempts of the votaries of alternative technologies who are scattered

among various Indian institutions. These individuals and groups have a catalytic role to play in establishing cells for the application of science and technology to the problems of rural areas, and of those below the poverty line. For these cells can:

(1) serve as agencies for increasing awareness of the rural situation; and

(2) help in correcting the present urban and Western bias in the educational, research and development programmes of the institutions, so that a significant fraction of these programmes acquire a bias in favour of villages and the poor.

The best way to raise water from a well. The fuel is free and in limitless supply. The environment is not threatened.

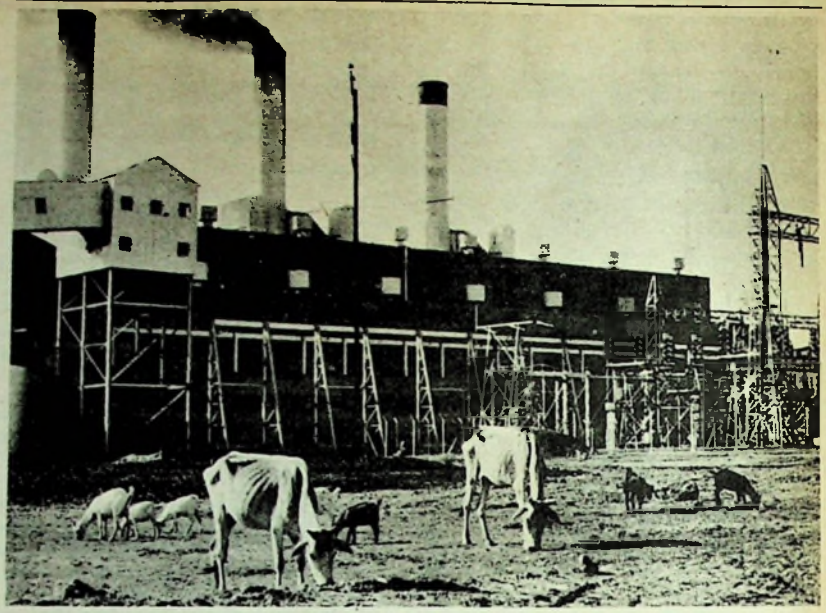
A PROGRAMME FOR CHANGE

In order to achieve these objectives, these cells can, in the first phase of activity; (1) catalyse the development/testing of village-oriented inequality-reduction technologies; (2) establish extension centres in nearby villages; and (3) transfer developed/tested technologies either to the villages (through the extension centres) or to other rural development agencies. Among the various classes of projects to be undertaken could perhaps be included the following:

(1) application of civil engineering to the rural environment – for example, development of low-cost building technology based on local materials;

(2) development and exploitation of locally-available energy sources, such as the wind, the sun and bio-gas, and the rational management of fuel sources such as forests;

(3) application of mechanical engineering design for the improvement of agricultural implements and operations, and of rural transport facilities;



Tradition and change side by side, but Western technology has nothing to offer the rural poor.

(4) development of small-scale industries to exploit local raw materials and agricultural products and wastes;

(5) development of small-scale industries to produce consumer goods for urban markets;

(6) development of techniques, books and low-cost learning materials for education in rural schools; and

(7) application of the environmental and ecological approach to rural resources such as soil, water, grassland, forests, livestock, wild life and fish.

The main emphasis in this initial phase is on the institutions educating themselves about rural reality, particularly about age-old techniques, empirical knowledge, the problems of those below the poverty line and their response to technologies in urban settings.

The necessity for this education phase cannot be overstressed. The standard approach of Western-oriented elite institutions is to assume that the needs of villages and of the rural poor can be met with *cheaper* and *cruder* versions of imported or urban technologies. Not only does such an approach inevitably end up with capital-intensive and labour-saving technologies which increase inequalities, but it accentuates the debilitating dependence of the villages upon the cities, and does damage to the fabric of village life.

A more appropriate approach is to start with a scientific study of traditional life and technologies, and generate qualitative changes with minor alterations and improvements. However, this presumes a depth of understanding of villages and their poorer sections that cannot be acquired by any city-based approach but only by a process of education in the countryside.

As experience of the rural environment grows, and as expertise develops in the technical component of solutions to rural problems, these institutions could well consider organising training programmes to produce rural technolgists – i.e. engineers with a wide range of capabilities who can build low-cost houses, erect windmills and bio-gas plants, design water conservation and management systems, set up small-scale chemical industries, and so on. Such a long-range perspective would at long last link Indian educational, scientific and technological institutions with the problems of the rural poor.

It is only such mutually educative contacts between Indian educationists, scientists and technologists and the rural population which will resolve the inevitable problems of language and communication characteristic of the present day polarisation into a dual society. It is also this contact which will, on the one hand, bring science and its methodology to the Indian people, and on the other hand, release their creative energies for the development of a non-elitist Indian education in science and technology.

TACTICAL NUCLEAR FUSION?

The Biotechnic Research and Development community was established in 1973 to investigate 'soft' technologies that would be "valid for all men for all time". But a little over a year later, a major split in the community surfaced, and Robin and Janine Clarke, who had been the community's founders, left. (See UC8.)

Philip Brachi, one of the BRAD members who remained, maintains that BRAD, in spite of its problems, has not been a failure. The first of the two articles that follow was written when the community was in its 'honey-moon' period and reflects the heady atmosphere of the early days at Eithin-y-Gaer. His second article, written a few months ago, is sadder but wiser — and still basically hopeful.

'Family portrait' of most of the members of the original BRAD community.

EARLY EITHIN DAZE

Ghost of roasted Seth crows a half-cock doodle-doo. Beginning with a backlit Corndon Hill, it's a timeless day at Eithin-y-Gaer.

"You can't live on a view", they said. But, practice before theory; it depends upon the view and the viewer. So let us see.

Have a gander at Horace and family, being early loosed by John; now fuelled with blighted spuds and fired for a new day's loathing of all within range of honking rage. Downie soft, but hissing hatred, (pure white as the driven detergent which we have not entirely left behind), Horace, Cynthia and Christmas Dinner are the harmless foil for a love gently growing among us here at Eithin.

We are eight adults plus three children, and many, many visitors. With a 750 cubic-metre home to build ourselves since April '73, the groovy soft technology experiments are gathering dust yet awhile. Ours is a social, ethical and spiritual adventure, as well as a scientific one; for the moment, and beyond, the former takes precedence. In the happily blurred areas of work and play Eithin rises.

Morning sounds assail the ear: twin, three, four hammers rapping patterned noise and random; or are there eight, with that crisp echo from the rowan-jewel wood? The notes rise as nails shorten and the structure tightens. A timber-merchant, reborn as Mike, laments: "It's only held together with nails!" Movement, wheelbarrows' squeak, oaths, sawing; a pause, and a cry of "Only perfect!"

Brick upon perfect brick, calendar-like, Philip's chimney curls too lazily skywards. Gargoyle, from high betwixt the bricks, surveys the day's visitors arriving. (Perhaps we shall install a lightning-conductor — for lightning conducted tours.) John, "the one with the *distinguished* beard", takes time off from turning us on to 240v.AC, to play Robin-Clarke-for-the-Day. Authentic Robin capers blithely on the 10-metre solar-roof ridge; where did his vertigo?

The visiting writer, family in tow, seems happy working through his list of 37 questions. To be back in NW3 by night-fall he will leave at 4pm, glad he can tick us off. He has missed the point: what does it feel like to be here? Why do other visitors come for a week, stay a month unpaid and sleeping rough, putting in twice the honest hours that they'd sell for £50 p.w. in the city? The best of visitors are often unannounced. Remember Bob, penniless but packing a shining spade, who sawed and danced, sang and dug the kitchen garden as has no-one before or since. Others have courage in their coming, opening themselves to us, and us to them sometimes. Perhaps half the house was built by them; and half our spirit too.

The bell is rung for lunch; outside, outsize, and in good measure home produced. Trestle tables take the load, quivering as Bambi underneath scratches her emerging horns and eats plasterboard. The sun is high. On home-made wine and work, so are we.

Relaxing, quietish, when a car in the lane signals folk approaching. Ducks and geese cry alarm; is it nine Cambridge students, pregnant and with dogs, wonders Maria. No, 'tis the media. *Nationwide* is easily repulsed. *The Experimenters* linger longer, promising that if we'll just re-enact those spontaneous scenes — as when Billy finally made Bambi; or our 5-hour marathon about where to site the stairs — they'll faithfully convey to the people our notions on how to live without fakin' it. Peter from the Sundry Trends col. supp. gets nearest, (with his Retsina wine), but fails to adjust his mind-set to what is all about him.

"Where's this soft technology, then?" Well, the heat-pump (13 kilowatt out for 4 kilowatts in, we hope) lies in Broody's barn; a double Savonius rotor in the dining room. The 56 square-metres of aluminium solar roof went up and on in a memorable communal morning, but won't be glassed or polythened, let alone yielding 20 kilowatts of water heating, until next summer's high noons. But we can offer joinery, a soft technology hardly changed for centuries. In the workshop Johanne discovers this, and herself in the timeless process. It takes four days to make a fine door (and just as long for one that looks like an Escher drawing!) Eithin has 32 new doors.

Maria is at home in her afternoon garden, hoeing to and fro the garlic; soon it will be lovingly plaited by Janine, after her brief sojourn in the Outside World, reporting back the bombs and the metropolitan mood.

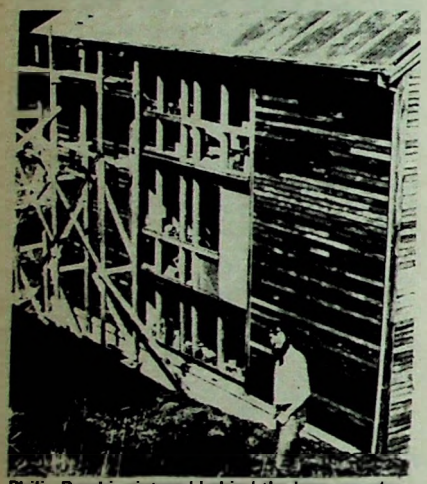
A quarter-mile below the garden Kevin Atom and the Nuclear Family are week-ending in their motorway-borne, outbid-the-locals, Plaid-baiting second home. He, but not we, got an improvement grant: it seems we're not a 'conventional dwelling house'. Still, for about £1000 per head, we shall be occupying and powering, in no mean style, some twenty souls (to be doubled by a later project) on just 43 acres of Min of Ag Grade IV Welsh hill-side. Most local people have been warmly encouraging, and often of great help. Where would we be without neighbour Frank, teaching us to farm as though we would live a thousand years, to live as though we would die tomorrow? Here he is on his daily visit, in time for a cup of tea.

Smells of fresh-baked bread; and the sound of Little Robin freshly back from

school, re-entering his private world of Blue Vans, Land Rovers and trips to the Blue Bell. Above us, buzzards – a pair and their baby – circle, mewing, soaring; flight shaming the low-level RAF, for whom we are considering a very big crossbow.

Tea – and scant sympathy for our antipodean architect Peter B, who yells "Farrr out!", balanced one-legged on the unsecured gable-end; then cuts his finger opening the first-aid tin for another. "How long before you grow tea in the two-storey conservatory?" Hmmm . . . these absolutist day-trippers!

A dusky hour or two in a three-man sawing, chopping 18-inch winter fuel reminds us that what the eco-freaks are calling 'alternative technology' is pretty much like what the straights call 'labouring'; sub-zero, snow falling, the light is poor. Yet there is absolutely nowhere we would rather be. Tomorrow, if the day is fine, we'll maybe all walk Offa's Dyke to that friendly pub; five days off declared from August to December is not a lot.



Philip Brachi, pictured behind the huge wooden extension tacked on to the rear of the original farmhouse.

Across the yard teeny-bopper urban guests tweak the teats of oh-so-patient Bambi. Our own Popsy and Beeb will be the next to learn. (No fridge for the milk though, for these devices are fated here. Yet we hope to heat our home that way!)

And later, supper, round the sycamore table ten by five. Mike, with groaning bawd, descends o'erfast from precarious noggin-bashing to join us. Good food eaten together is one of the better things in life; and elderflower champagne is one of the best.

Jotul and Sofono are living fires beyond the NCB's imagining: logs for heat and baking, seen by some through eyes of fire. Bogs curls by the hearth. The smell of woodsmoke everywhere, overlaid too often by John's very own Eithin Gold. (It's tobacco, honestly!)

"But what do you do in the evenings?"; they always ask. We talk or embroider long underpants; we read or scrape fleeces; or sing with Peter's music; sometimes we laugh a long while. Rural idiocy already perhaps, born of a joy and slow certainty: fears, threats, facades receding; security in a sense of place. Just living, really; what do you do?

A bonfire now, maybe; Nick the Nieztsche-packing, nature-loving chippy comes into his own then, dancing, lurching, launching live sparks into the constellation night. Our house, windows lately glazed, looks out with light. Gods know what goes on beyond them! "Tomorrow rides a rainbow" Peter sings, and we are one. Silent unthreatening cars are ships in the night upon Corndon Hill; the valley village a harbour beneath.

So the view changes, and our own views with it.

You don't hear BRAD mentioned much now; it's a mellower Eithin-y-Gaer. No longer a soft technology research outfit, organised as a commune; we're a commune, not organised, who happen to do some AT research.

Kind Robin ("Valid for all men for all time") is much given to the epigrammatic. "Too red and too green" was his gem for one of the wider-eyed world-savers amongst us. Think on it.

NOTHING SUCCEEDS LIKE FAILURE

NO EXPERIMENT ever fails. The habit of rating communal living as success or failure solely in terms of its longevity is notorious, naive, yet understandable. Never having truly experienced community, most writers miss much of its essential purpose and satisfactions, and are relieved to seize upon something quantifiable. I shall try to go a little deeper here.

Two and a half years ago *Undercurrents* reported the Biotechnic Research and Development Community's beginnings. Formed to research and develop 'soft technologies' – ways of heating, lighting, housing and feeding ourselves using renewable sun, wind, wood, and water power – we had bought a small Montgomeryshire hill farm; and a big home-built extension to incorporate the clever devices was under way. "All fifteen should be living there within a year", someone wrote. In fact we reached thirteen souls. Today just four remain.

"Love thy neighbour as thyself", scored by Jesus as the second commandment, might be placed first by prospective communards. As an exhortation, though, it contains a massive assumption: what if you are not too happy with yourself? But that is getting ahead of the story!

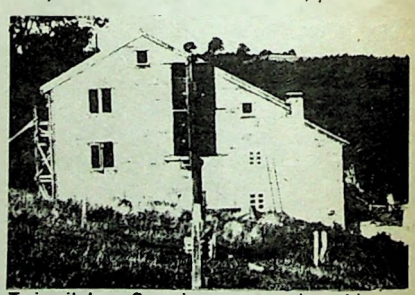
We were a fairly middle-class group – the sort who might prefer 'community' to 'commune' – sharing a common disaffection with urban life. Middle-class, perhaps, because it is those who have "made it" in straight society who are best able to decide that, for them at least, 'it' was not worth making. And, of course, there is the question of money. The entire project, including stocking the farm, cost about £1700 each for the thirteen of us; a modest price for such a life, for such freedoms. I shall say more about freedom later.

Our spread of ages – three in our twenties, four in the thirties, two forties, a quinquagenarian, and three under-fives – was a definite asset. It probably helped early relations with our new neighbours, until the obvious seriousness of the building and farming efforts overcame any mistrust of hair and beard. A fair breadth of background meant that not all of us were too dewy-eyed about the venture. Nor is age seniority here: we young ones were not deferential!

Strong leadership, or at least a binding common cause or creed, is normally deemed essential for any enduring community. But for it to work well in terms of personal growth, each individual being enabled to realise his or her whole self, something of the opposite is true. In accepting leadership within the community one is agreeing to boundaries: limits to responsibility and possible evolution. A leader offers an easy cop-out: a father or mother figure to love, hate, shelter behind or stab in the back. Leaderless it is less comfortable; but then growing up never was an easy trip.

A venture such as ours therefore resists direction; rather it evolves, steered by an aggregate of the individuals here, resulting sometimes in synergy, sometimes attrition. While kept in time, daily by the animals, annually by the seasons' necessities, we cannot say where we shall be – indeed whether we shall be together at all – a year from now. This lack of any definite direction causes problems.

We each entered the commune with a fantasy; not in the sense of mad delusions, but a well worked out scenario of expectations. For a time you project, superimposing your fantasy upon unfolding reality; until the scene diverges dramatically from one's personal script: your wife walks out; the newborn calf dies; the windmill fails to work; your husband sleeps with the woman downstairs; the barley crop rots. Then you either freak out completely, adjust your fantasy, or draw a deep breath and begin to grow up.



Twin oil-drum Savonius rotor stands at side of BRAD's Eithin-y-Gaer farmhouse.

In such a situation the commune's founder, probably by definition the person with the longest-running and most detailed fantasy, is likely to be the first casualty of disillusion.

And what of casualties among marriages and other relationships, such a common

fear when considering community? What can we offer to confirm or confound the *News of the World* image of communal living? At least one dull marriage, wrought about with unspoken rules, roles, assumptions and dependencies, foundered early on. No tears over spilt milk there, for it had begun to sour some while before. A constricting relationship was replaced, within the same couple, by something rather more lively, honest and sound, if less determinedly eternal; a crisis unlikely to have worked out so constructively in the former arena of the game-playing tactical nuclear family. Informally, voluntarily, the wider community can offer concerned, gentle referees to such a marital situation.

Open marriage, group marriage; trendy phrases both, but not much sign of either yet. So how fares the communal incest taboo? With three or four couples and two further healthy males, it would be surprising if it were intact. As with those of nakedness and touch, occasional cracks appear. These are superficial criteria, though; there's no such thing as 'instant community'.

Privacy is the other necessary aspect of living together. If the commune succeeds in its prime purpose of bringing out the unique potential of each individual, then this demands at least the minimal spatial expression: one person, one room. Whether or not two people may consider themselves a couple, privacy is, or ought to be, indivisible; this is negated if a single room has to be shared. The option should always be there: to be apart when necessary. This belated discovery, the house having been built to the overly cosy design of eight double bedrooms, newly limits the number of folk we can house here. Nonetheless, we are agreed that about eight adults plus children is the right number. This is not a calculation, but a feeling.

One non-problem has been income sharing. Each member earns whatever he or she can (without going out to work full-time, for that would destroy the community's essence.) Keeping back what they think they need, the rest is put in the communal kitty. There have been huge inequalities in both income and capital inputs; but providing no corresponding hierarchy is allowed, this simple system of trust has worked very well.

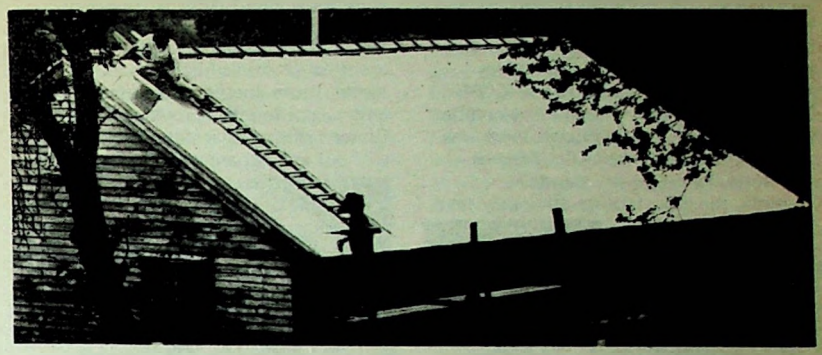
The degree of communality of one's personal belongings is again based on trust and individual choice rather than on any rules. One puts in to general use what furniture, books, kitchen equipment, tools, records one wishes. Vehicles have always been pooled, or sold to raise communal capital. It is true that communal items, whether through lack of knowledge or something more profound, are not as well cared for as individual possessions. Perhaps this will now change; those who risked least, and so made the commune the less their home, have now moved on.

So why do people leave? Freedom is central. In one sense we have built a very free life for ourselves. Gone is the need to play roles to gain respect from one's neighbours, workmates, partner or family; instead one is free simply to be oneself. Perversely, this is perhaps the very hardest thing of all, for upon introspection we find that most of our life is lived out in the form of roles, many and various. Gradually, usually humanely, this place has a way of exposing such nonsenses, enabling one to transcend these constraints and become more fully and truly oneself. Which, of course, poses forcibly such basic and utterly personal questions as Who am I? What do I really hold dear? Why in relationships do I think and act as I do? With its deliberate lack of hierarchy, a wary eye for the charismatic leader, and an absence of the structured time one became so used to in the cities, the community is a natural setting in which to seek and share the answers.

With the freedom, though, come modest but time-consuming obligations. Our sole rule is that whoever has not cooked for longest washes up tonight and cooks tomorrow. Begun as an unwritten rota to improve the women's lot, the kitchen day has become — through the variety, care and quality of the meals — a focus for the expression of communal love, no less. For each to *feed* our friends; we have chanced on a fundamental here, we feel.

As people are enabled to grow in freedom, sexist roles may be blurred or broken: a man becomes a child-minder, a cook; a woman becomes a car mechanic, a carpenter. Tangible, occasionally joyous evidence of personal evolution; but it can be hard to handle when such a blossoming occurs at different rates within a couple. Old patterns are smashed; challenge, uncertainty, threat; all are present for the partner who feels left behind. As the one grows outwards towards the group and new satisfactions, the other may feel neglected and turn away to seek security or solace. Such a situation, not untypical here, requires an openness and honesty, an ability to hurl shit and absorb its impact, quite antithetical to straight middle-class upbringing. Lacking in the past, we feel that some structured 'encounter group' work may help us here. For unless there is a willingness to dig a little beyond the surface of statement and appearance, true community may never be experienced: one's own frustrations, hang-ups, presumed inadequacies are taken out on others. Roles, games, shallowness and mistrust abound. The other path, harder by far, demands a truthfulness and gentle understanding from all concerned; the outcome of a painful process can be relief, unburdening, and a real empathy with that overused word 'together'.

Some people, of course, will have none of it. Any such notions are for them irrevocably tainted by association with therapy, and hence with mental illness or abnormality. Hail and hearty for the most part, they denounce such evolution: "one's soul pinned bleeding to the wall", "contemplating one's emotional navel". It is all mere distraction from the real life of physical teamwork, the men pulling together, the good inebriate times. For them no synthesis is possible. The real communal experience is simply refused. Eventually some deeper doubt or trouble intrudes, but is not shared; on one pretext or another, often amicably, they leave the community.



Overall view of BRAD's solar roof.

In pensive mood the four of us await the autumn newcomers who will double our numbers. Shall we progress, or will the same scenes be played out again?

For those who don't confuse a lack of self-consciousness with self-awareness, the communal experience can be a catalyst to life's journey. Still, one hopes that those who left have found their place. It is not right to decry others' happiness, however unadventurous it may seem. And yet I feel that 'happiness' is a somewhat soggy word, connoting always a lukewarm security, unlikely to be threatened or disturbed by life; a deceptively comfortable limiting of one's possibilities. Joy, by comparison, is extreme. And a growing community is a creature of extremes. If the heights are dizzily exhilarating, transcendent even, the depths can be fathomless dark indeed. There is not one without the other. We must comprehend both.

These are tentative thoughts, for we have barely begun. But the essential message from here seems to be that building a solar roof, one's own house even, is child's play compared with close, honest, open communal living therein.

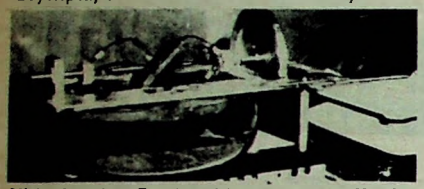
Yes, there has been joy here; else I would not have stayed. If this community folds tomorrow it will not, for me, have been any sort of failure.

IN AUGUST, in the sunshine, in the open air, the alternative technology movement came together at the COMTEK festival in Bath.

In November, in the spot-lit, centrally-heated enclave of Olympia in London, the industrialists replied with their own mini-AT festival – the Ambient Energy stand at this year's Interbuild exhibition.

AMBIENT LUCRE

The similarities were as striking as the differences. The Ambient Energy stand, with its platforms and gangways made from bright new orange painted handy-angle, was reminiscent of the dodgey planks and rusting scaffolding of COM-TEK's walkways, but much more compact and regimented. And although there was none of the mini-skirted sales persons who normally adorn the stands at Olympia, the industrialists obviously take their AT marketing seriously.



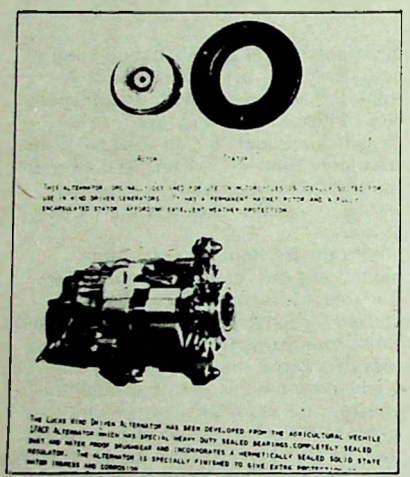
Nitinol engine. Employs 'shape memory effect'. Pieces of nitinol metal deform when dipped into hot water, and spring back to original shape when they emerge. This deflection is cunningly geared to drive a flywheel. Or something like that.

It's a pretty competitive market, too. Solar collectors made from Aluminium, Steel, Copper and Plastic were all challenging one another as the 'best deal'. Above them whirled (under battery power) that old faithful, the 200w Winco Wincharger, flanked on one side by a large (and, thankfully, stationary) 5kW Elektro mill and on the other by a small Sparco wind pump, all available from Conservation Tools and Technology.

There was a display of the Milton Keynes solar house and a model of the Cambridge Autarkic house. And, in an alcove, there was an irritatingly-glib tape-slide show about Alternative Energy sources which, in between giving thinly-veiled plugs for the organiser of the stand, architect Dominic Michaelis, jumped nimbly from energy systems built by AT enthusiasts to mega-projects like the Glaser orbiting solar power station without any apparent awareness of the enormous differences.

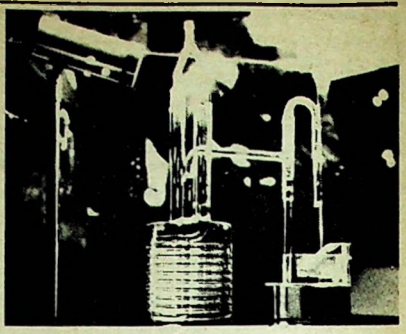
A couple of low-efficiency devices for using solar energy (or waste heat) were also in evidence – namely the Fluidyne engine developed at the Atomic Energy Research Establishment, Harwell by Dr Colin West; and the Nitinol engine, developed at Bristol University.

One of the most interesting exhibits was the Lucas display, which revealed that whatever may happen at Lucas Aerospace, the Lucas parent company, Joseph Lucas Ltd., are coming back into the wind-generator market again with a couple of up-dated versions of the 180w Lucas Freelite which they took out of production some years ago due to lack of demand.



Part of the Lucas display. Above, rotor and stator from RM21 motorcycle alternator. Below, 17ACR-type car alternator, with special weatherproof finish.

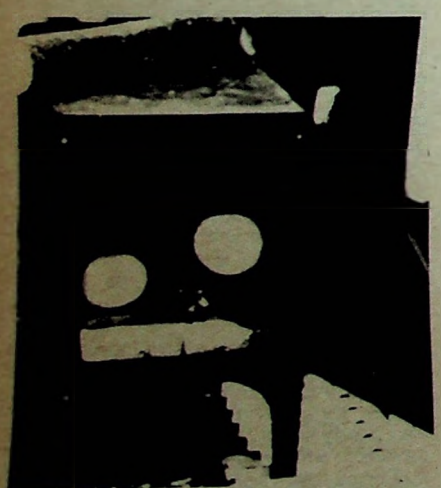
Lucas, it seems, are basing their new wind generator designs on two slightly-modified direct-driven Lucas alternators: the RM21 type motorcycle alternator, which has a permanent magnet rotor and so needs no energising field current, and which has delivered up to 4amps at 12 volts in a small prototype test rig; and the bigger 17ACR type car alternator, which has pushed out 14 amps at 12 volts on a larger test windmill. It doesn't look as if Lucas itself will be marketing complete mills. They refer prospective purchasers of the small machine to either CTT or to Alma Components, Park Road, Diss, Norfolk. Alma, it seems, are also the source of further information on the larger unit.



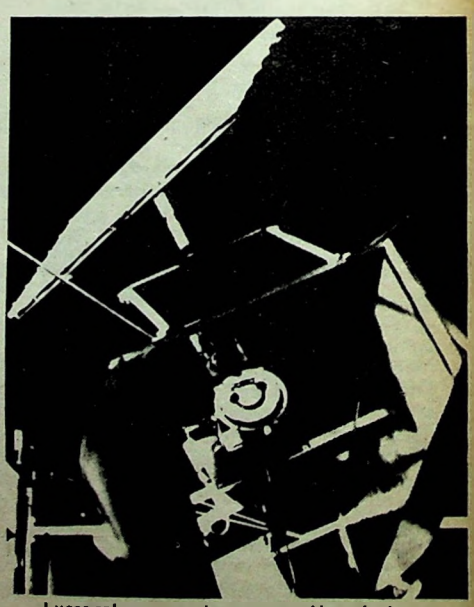
Fluidyne-3 pump. Heat (from another spot-light) concentrated in one arm of inverted U-tube warms air inside and squeezes water in adjoining reservoir through output valve. More water enters through input valve, and the process is repeated at the system's natural resonant frequency. Or something like that.

Lucas seem more interested in the more-lucrative solar-electric cells, made by the Solar Power Corporation in the States, which they market. An array of these cells was used to power the attractive-but-gimmicky Lucas Solar Catamaran which formed an intensely-floodlit-focal point to the Ambient Energy display. Indeed it was the flood-lighting – a major feature of all the displays and supplied of course by the National Grid – that epitomised the contradictions inherent in trying to market 'alternative', resource-conserving technologies within the framework of a highly competitive capitalist economy. The power consumed by the spotlights and air conditioning plant serving the Ambient Energy Stand must have far out-weighed the combined power output of all the 'AT' devices on display. At least at COMTEK we practised what we were preaching: exhibits were lit by ambient sunlight, and exhibitors were warmed by ambient sunshine.

Godfrey Boyle and Dave Elliott



Conservation Tools and Technology's new wood-burning stove. Said to produce 6kW of continuous heat for 24 hours by burning 36lbs of timber. Sounds efficient: and so it should be at £65. But why is it made of steel sheet which wears out in about five years—instead of the traditional last-a-lifetime cast iron? Not exactly a Conservation Tool, I'd say . . . . .



Lucas solar-powered catamaran. Haven't they ever heard of *sails*?

REVIEWS

Winner Takes Oil

Oil and World Power, Peter R Odell. 245pp. Penguin. 60p; *Oil, the Biggest Business*, Christopher Tugendhat and Adrian Hamilton. 404pp. Eyre Methuen. £6.25; *Taching, Red Banner on China's Industrial Front*. 46 pp. Foreign Languages Press, Peking. 5p; *Arabia Without Sultans*, Fred Halliday. 527pp. Penguin. £1; *Oil, A Plain Man's Guide to the Energy Crisis*, Philip Windsor [sic]. 178pp. Maurice Temple Smith. £1.95; *The Energy Crisis, World Struggle for Power and Wealth*, Michael Tanzer. 171pp. Monthly Review Press. £3.95; *The Seven Sisters*, Anthony Sampson. 334pp. Hodder and Staughton. £4.95; *Oil and Imperialism in East Asia*, Malcolm Caldwell. 22pp. Spokesman Books. 20p.

This review has been stewing in my mind for a year, and anyone who has been in a bookshop lately knows why. The amount written about oil seems to have increased at least with the square of the posted price, and there have been constant delays while just *one* more important book came out. And still they come; the Mackays' *Political Economy of North Sea Oil*, for instance, to which I shall return in a subsequent issue, which is one of the British political hot potatoes of the decade.

These eight books embody a variety of approaches to the oil business, and allow us to get a good, multifaceted view of it. The approaches exemplified are the capitalist (Tugendhat and Hamilton, Odell), the well-meaning liberal (Sampson, Windsor) and the revolutionary (Caldwell, Halliday, Taching and Tanzer).

But the books themselves aren't easy to review in that order. Instead, let's start with the top of the market price-wise, and with two books which cover the history of the business from before Rockefeller. These are Sampson, of ITT revelations fame and the *Observer*, and Tugendhat and Hamilton, the first the Tory MP for Westminster and the second the oil correspondent of the *Financial Times*. Theirs could have been the best of these books; but they blow it completely with a turgid over-detailed plough through a lot of very dead history that no-one will want to read although Sampson manages to make it much more interesting. Most of the book is shamelessly re-used with very little alteration from the first edition of 1968, and even parts of the second half on recent events look dated. All in all, their book is a very expensive way of discovering the sort of thing about the industry that doesn't really help you to decide what to do or think, even if you can stick it out to the end.

Sampson is a quite different business. As readers of his *Anatomy of Britain* and other books will know, he is very hard-working, and writes very informative and easily-read material. His ideas on large capitalist organisations are familiar from his work on ITT; he's against them. And in this book he certainly finds enough information on the major oil companies to put his case fairly well, although without any great ideas as to how to replace them.

In many ways his is the best book in the bunch, and it is certainly the most fascinating; although he is basically an enemy of the large companies, he is happy, in this and all his books, to make it clear that they love him and are pleased to admit him to their inner counsels. Details of nuances of board meetings elbow each other across pages, Yamani vies with Benn, Eric Drake with Qadaffi. It has never occurred to Sampson in any of his four books I have read that a company or a country consists of more than its senior executives, so that the political and social facts of the countries and companies are submerged in *Troubleshooters*-type hustling. But we shall soon reach a few works which cover the political reality rather more rigorously, so don't despair. And, saving the book from 'yet another' status, there is Sampson's central hypothesis, which is of fundamental interest to *Undercurrents* readers. It is simply that oil always finds its way into very few hands; from the freebooting mess of the Pennsylvanian 1890s to Rockefeller, the accountant; from Russia, Arabia and Texas to his Seven Sisters, waltzing a bizarre contrapuntal cartel across continents, usually not even pretending to compete; and from them to OPEC, the producers, with the Companies allowed to be profitable downstream marketing organisations. As he puts it, it all seems very convincing, and this reviewer realised with a shock, only later, that it was in fact a completely post hoc hypothesis, and rather hard to apply to what happens next. It was impossible in, say, 1970, to tell that sleepy, unchanging OPEC would suddenly grab the reins, just as it was impossible half a century earlier to tell that Shell and Standard were going to grab most of the goodies out of the mess following the First World War. Once it's happened, any half-decent economic theory can follow it on; but before and during the change, it's inherently impossible to say what's next. Maybe if Sampson had applied some Catastrophe Theory . . . . .

WELTPOLITIK

So; if you want a very entertaining and keensighted tour of the history and present nature of the industry, *The Seven Sisters* is the one. And there's not much need to pay £4.95 as his books are usually paperbacked inside a year or two.

The only other book among the bunch which purports to cover the whole field is Odell's. It has by far the most distinguished author, it's cheap and it's comprehensive. It doesn't give the reader heaps of history but covers the world industry and its relation to political and economic realities in eight very tightly assembled chapters, with a ninth on recent developments. So his book and Sampson's are a good pair for anyone interested in oil *weltpolitik*. This book really doesn't approach the reserves estimation business which Odell finds so contentious and is the sort of good enthusiastic overall guide that many less well documented industries would envy.

The last of the non-radical books in the bunch is Windsor's. You may be sick of this by now, but his is a very *good* book, and one that a ten-year-old could read and know a lot about oil at the end of. Certainly every journalist in the radical press should be made to read it through; in the land of the obscurantist the clear-seer is King, and Windsor's book, with chapters like 'What Happened' and 'What Happened Next', shames on the one hand most of the obfuscating radical comment and on the other the industry heavies like Tugendhat and Hamilton. The penitent radical journalist would also learn that the world is not nearly as simple as pieces in various *Ramparts* of the radical press have recently suggested and that oil companies are after supplies first, markets second and profits very much third (although their fantastic historic profitability is all that allows them this strength). And he would read a very cautious and thoughtful, if standardised, few lines on the possibilities of non-oil sources of energy which provide a good view of the enemy and the prize for the AT enthusiast.

And so to the radical oilmen; three write about specific areas (China, SE Asia, the Gulf) and one, Tanzer, gives an excellent socialist guide to all the energy crisis gumph put out by the bourgeois

press. The fact is that oil has users – road users by car and bus, for instance – whose situation has been adequately explored by the left, and companies marketing it, which any group with a reasonable amount of dedication – eg CIS a couple of years ago – can rumble. But there are also producing countries, mostly underdeveloped, and for these oil extraction is just foreign exploitation, keeping *Undercurrents* readers in luxury at the cost of poverty for all but a grossly overprivileged minority, military intervention by foreign or nominally domestic forces and deliberate underdevelopment buttressed where necessary by ludicrous reform. And, of course, there are third world countries who look with jealousy at the economic inconvenience which is the worst the West has to suffer at OPEC's hands; although OPEC do seem genuinely willing to help alleviate their plight in a way calculated to shame the Christians' charity.

NOUVEAU RICHE

All of this is the stuff of Tanzer's argument; he talks about oil economics and energy economics, about the producers, the consumers and the companies, and about the poor, the affluent and the nouveau riche, as does, say, Odell. But he writes about them from the viewpoint of the Left, and covers aspects of political reality in producing and consuming countries in some depth, so that the newspaper image of swarthy Sheiks united in the pursuit of Western dollars is well trounced. His is at least as good a general guide as Odell's, Sampson's or Windsor's, in depth and breadth, and covers the material so soundly that it is unquestionably one of the musts for a serious radical analysis of oil matters. There's not a lot else to say, really; this is just one of the essential works.

Halliday, formerly of *Seven Days*, and Caldwell apply basic – in the latter case, very basic – radical principles to the Gulf and SE Asia respectively. Halliday's book is a big 'un, fifteen hefty chapters covering more than 500 pages, and it's as good an analysis of Gulf politics as you're likely to need. Apart from general background on the area, it provides a marvellous first-hand view of revolutionary organisations in these countries and their usually abortive struggles. In particular, he talks about the revolutionary opposition (the only one there is) in Oman and Dhofar, fighting largely against British troops on contract, the successful fight for independence in neighbouring South Yemen, formerly Aden, and the relations between these countries and Saudi Arabia, Egypt and Iran, which is the USA's main agent of intervention in the area. The book is very thorough in an area where hard information is hard to come by (the *Times* and *Financial Times* recently carried totally contradictory pieces on the Oman war on successive days) and stands head and shoulders above the range of duplicated leaflets, available only in a few Left shops, which are unfortunately the only British publicity these groups can usually manage. Apart from not replying to the discreet ads for fighter pilots in the *Daily Telegraph*, there's not a lot we can do to further any of these liberation struggles, apart from getting off their backs in the long term by not using the oil. But a chance may come, even in Dhofar, from where the news at present is very black.

In SE Asia the position is a good deal simpler. There are a few reactionary regimes – Indonesia, Hong Kong – holding much of the oil, and a few revolutionary ones – Vietnam, Cambodia, Laos – with a lot of potential but not much oil. The question of how much of the trouble these countries have had freeing themselves is oil's fault is a good one. But apart from telling the reader that oil is very important in SE Asia, and that a few companies and individuals are getting rich at the expense of a lot of oppressed people, Caldwell devotes most of his attention to a hilarious load of hearsay, completely ruining his case. For instance

"A friend of mine – a distinguished archaeologist – was in Thailand recently. He got into conversation with an American, ... who talked of maps far more detailed and accurate than those available to the general public. . . . . They left the Hotel Bar and took the hotel lift to the top floor, which was out of bounds to the ordinary guests. He was shown a magnificently appointed map room, with maps of the region so much superior to known ones that his professional interest was at once engaged . . . They were interrupted by a superior, another American, who rebuked the first for having brought a member of the public into the 'secret' apartment. My friend concludes that it is an American military establishment, but operating with oil in mind, since much of the information on the maps was relevant to exploration and drilling.'

That just about captures the flavour of the book; a very few facts and some visible errors spread very thin – no small achievement in a book of 18 text pages on such a vast topic. Well, it's cheap and the best there is.

The last book is in lots of ways the most interesting; it's one of those little cheap ones they have in Maoist bookshops, *Taching, Red Banner on China's Industrial Front*. It talks about nothing but the development of the Taching oilfield, in dreadful conditions, almost entirely without equipment, and with no foreign aid, by such groups as the 1205 drilling team, whose Wang Chin-hsi is the subject of a major hero-building campaign in China at present. Like lots of other things Chinese, the book is essentially a lesson in how things can be done quite differently from the Western way, and often better; whether the way used could ever be practical in the West is quite a separate question, but often one can't help hoping.

Well, if you're not sick of oil by now you'll have a fair idea of how to find out more. Apart from Tugendhat and Hamilton's, there isn't a really *bad* book among this lot, and any radical technologist could learn plenty from any of them.

Martin Ince

Other Mags

Other Times. 48pp. Box A, 240 Camden High Street, London NW1. 60p; *Practical Self-Sufficiency*. 32pp. Broad Leys Publishing Co., Widdington, Essex. 60p; and *Natural Energy News*.

The magazine trade flourishes in spite of cost increases and technically unambitious, rather expensive titles. Some may pine for the days when they could buy half-a-dozen multi-coloured underground rags and collect change from a ten-bob note, but under the new regime numbers continue to grow. All over the land people are acquiring the photo-litho habit and rushing to press with ease, bringing down upon the public a range of facts and opinions not formerly considered printable. Such a phenomenon has far-reaching possibilities; all that's needed now is readers.

"*Other Times* is our way of striking back at the alienated existence irresponsibly termed reality," the editors proclaim in strident tones, all modesty thrown to the winds. One is instinctively sympathetic to such an exercise, but its impact is muted by a prevailing sense of gloom. Such depressing grandeur, to be pissed off with reality itself: what about the Good Times? I mulled over its stark Gothic outlines and proceeded with caution.

It kicks off with a piece of SciFi by Barry Malzburg about ambition, drive and sexual fantasy, set in the now classic genre of the J F Kennedy shattered-idol image. Economic, readable, often perceptive about the erotic correlates of social indifference, it bears taking moderately seriously. The ensuing comic-strip by Chris Welch does not (sigh of relief) crave solemnity, though his pleasing graphics are undermined by a weak, self-mocking story-line. On the bright side is a chunk from Paul Hammond's study of weirdo French film-pioneer Georges Méliès, as well as a generous selection of the late Mai Dean's Magrittesque drawings. So far, so good.

In among all this, however, the editors could usefully tighten the party-line on plain talking. A recurrent weakness of 'imaginative' literature is lazy, selfish refusal to capture meaning in the common property of everyday language, something particularly evident in the short stories by John Sladek and Rikki Ducornet. As

a collage of impressions the effect was confused, confusing and ultimately pointless, putting one in mind of Kurt Vonnegut's dictum that the only difference between art and insanity is that art *communicates*. This applies more regrettably to Eric Mottram's *Dionysus in America*, a considerable analysis of Rock Culture which varies greatly in tone from scintillation to feeble obscurity. Perhaps readers should start making heavy demands on their writers, instead of vice versa. Of *Other Times* they might well demand more matter with less pessimism next time round.

You certainly wouldn't find the proprietors of *Practical Self Sufficiency* crying into their beer about "the murderous boredom of everyday life." As different from *Other Times* as chalk from hard cheese it confronts despair with a deep breath and a bag of nails and points to the great green yonder. Bright and airy, attractively designed and illustrated, its barely 31 pages of text would be an amusing read at half the price, but at 60p it merely demonstrates to the earnest the importance of being rich.

Some of the contents is bizarre, such as the five pages of instructions on how to keep a virtually non-existent breed of cattle. There are articles on growing watercress and berries, hot-bed gardening, seed-sprounting, tool-sharpening, lamp-maintaining and more, none of them world-shattering but useful if that's what you need. And a very readable feature by Susan Allen on John Seymour's Centre for Living; cheerful, hopeful, starry-eyed, for me the best piece in the paper.

But there was altogether more niceness than this jaded hack could cope with in one session, and some unfortunate omissions, too. It would have been worth pointing out that since there is only half an acre of good farmland per person in this country, anyone who exceeds that ration is not self-sufficient but merely converting social capital into private food. Nor was there any hint of the revolutionary land-reform which will be needed before self-sufficiency can become anything more than a peripheral class privilege. If they're talking about the middle-class professional who makes his killing in the city and then blows it all on a country rest-cure for life, then they're talking about privilege pure and simple. Before I send off my subscription I'd like to know if and under what circumstances the *PSS* people intend to let the rest of us out there.

When the *Natural Energy News* handout flopped onto the doormat at the *Undercurrents* secret headquarters it seemed like Armageddon was at hand. Subtitled 'the international journal of alternative technology' it was going to report on AT R&D the world over, be advertised nationally, get mailed to patent examiners in 100 major centres and enjoy the beneficent support of NCAT. The dynamic, superlative, big-business approach was overwhelming: "looks like the end of the road for us," we thought.

Then someone had a bright idea and rang Robert Godfrey, the publisher of this answer to every AT-freak's dreams, and *he* seemed rather surprised to hear from us. "Oh . . . . I thought no-one was ever going to phone me," he groaned.

"But what about this magazine of yours?"

"Oh *that* . . . . well that was just a kite to see if I could drum up some advertising. Not much in it, I'm afraid, so there isn't going to be a magazine after all. You *Undercurrents* people . . . . I don't know how on earth you can do it at the price!"

Martyn Partridge

It Might Never Happen

Inventing Tomorrow, Michael Allaby. Hodder & Stoughton. £4.25.

Many people are naturally fearful for the future – they see ahead only social and environmental crises and wonder what they should do to protect themselves. There is no shortage of large-scale 'solutions' – ranging from totalitarian central control at the global level based on advanced technical fixes, to anarcho-syndicalist decentralisation, based on soft technology. Since the environmental movement's rhetoric of the past decade or so has to a considerable extent put the latter choice more firmly on the agenda, it is good to see that one of the spokesmen of that movement has written a new book. Michael Allaby was one of the authors of *A Blueprint for Survival*, which way back in January 1972 laid before a fairly large audience the case for technological and economic decentralisation, albeit in a way which met with considerable criticism from radicals. In this new book Allaby tends to recant on some of the Blueprint's easy generalisations and strident ecologically underpinned convictions and prescriptions. Looking in retrospect he seems to have come to the conclusion that 'the crisis', although real, is not as daunting as the doomsters of the early '70s would have us believe. So there are no comprehensive or detailed plans.

Allaby says that his original aim was to "suggest ways in which the individual might modify his or her lifestyle so as to be better off in five, ten or twenty years from now, in spite of the economic and other calamities we see about us". But in reality this is not what he does. This is not a survival scrapbook. For Allaby feels that the best way to equip people with the power to survive is to help them explore possible alternative futures. Consequently he presents a number of normative predictions and scenarios – some utopian, and some dystopian – his aim being thereby "to draw some kind of picture, smudgy and shadowy, no doubt, of the kind of world we might build . . ."

Perhaps inevitably his picture *is* smudgy and shadowy. Certainly he provides little direct advice on "how to be better off in a changing world" (a somewhat unfortunate chapter heading in any case). His comments on Alternative Energy technology, food, transport, education, medicine, welfare services will be familiar enough to *Undercurrents* readers, although this part of the book provides a useful summary and compilation of the general case for and nature of the 'alternative' society. In general however he makes a case not for radical social, economic and technical change but rather for radical philosophical 'world view' changes and argues for a new quasi-religious attitude towards nature to replace our present Faustian arrogance. His strategies for getting to the alternative future (ie 'how to best change the world') are in political terms, fairly moderate, not to say reformist. He talks of 'devolution' local government re-organisation, government Commissions, supra-national bodies, conferences and so on, while at the same time urging individuals to try to participate in local affairs, get involved with local environmentalist groups etc. Now these sorts of activity at the grass roots are not to be despised . . . . but Allaby seems to be unaware of the imbalance of power between such groups and the multinational businesses and technocracies which are at present, inasmuch as anyone is, in control.

And yet Allaby in other parts of the book seems keenly aware of the economic intrigues and power politics which made up 'the oil crisis'. This of course is the basic flaw of most libertarian, anarchist or decentralist thinking – whether about strategies for change or the idealised goal. For example, it is comparatively easy to prescribe decentral utopias based on autonomous, self-sufficient self-managing communities, and perhaps not too hard to see how a few such communities could be federated together in some form of syndicate for trade and mutual aid. But how do you cope with the whole planet? For this we need another sort of Utopianism, and one which is fraught with considerable dangers; the dream of 'world government'. Allaby tries bravely to have his cake and eat it by suggesting that the

two are compatible. We can have ". . . large supranational institutions that exercise a limited authority over particular issues that transcend frontiers . . ." coupled with ". . . small, regional governments". So we can proceed "simultaneously in opposite directions" — thereby reducing the power of national states. But the nation state or central government is not the only power centre, or even the main source of power in modern capitalist society . . . . without some attention being paid to fundamental social and economic structural changes there is a grave danger that such prescriptions could pave the way for an improved and re-legitimised global corporate state combined with feudal decentralisation.

Allaby, however, is more concerned with mild reform and, more importantly, changing people's heads. Again this is a vital component of social and political change. Ideas and ideologies, beliefs and myths are as potent as physical fortresses, tanks, or secret police and can serve the same function. To open up options a little Allaby presents us with a quick dose of Zen Buddhism as part of a rather *Readers Digest*-like coverage of a huge range of human problems — concerning religion, philosophy, sociology, anthropology, history, human ecology spiced with scenarios concerning possible totalitarian or anarchistic futures and leavened by a fascinating blow by blow, book by book, account of the growth of the 'environmental movement' . . . .

Overall this is an ambitious book which, although it could perhaps have been better organised and thought out, opens up a number of questions and options in a way that despite the range of issues covered, will not terrify your average commuter. But answers and precise details will only emerge as part of the process of trying, despite all the odds. to build the future. **Dave Elliott**

Prime AT

Energy Primer, Solar, Water, Wind and Biofuels. 200pp. Published by Portola Institute in co-operation with New Alchemy West, Whole Earth Truck Store, Ecology Action Palo Alto and Alternative Sources of Energy. Distributed in the UK by Prism Press and available from bookshops at £3 or direct from Prism Press at Stable Court, Chalmington, Dorchester, DT2 0HB at £3.25.

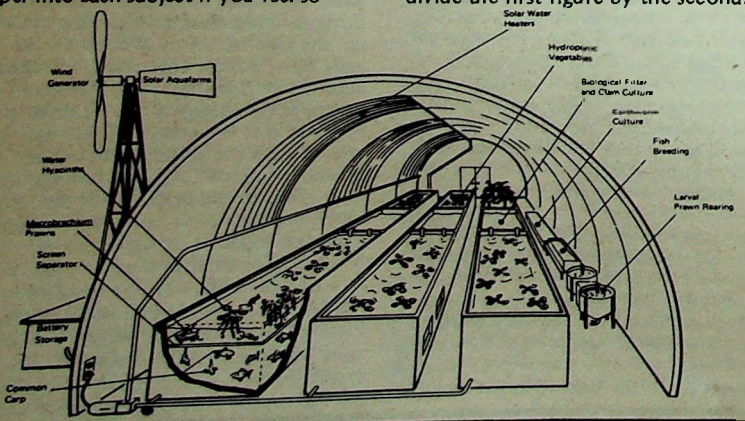
IT'S NO GOOD. I've spent the last couple of days trying to pick holes in the *Energy Primer*, and there just aren't any worth talking about. Without a doubt, everyone interested in harnessing renewable energy sources ought to have a copy. Now that the book's readily available in the UK, there really isn't any excuse for not laying your hands on one.

As the authors say at the very beginning, the energy primer is "not a cookbook". Only in a few places are there precise, detailed drawings describing the *exact* method of construction of specific devices.

On the other hand, each of the four major sections — on Solar, Wind, Water and Biofuels — is crammed with facts, graphs, pictures, formulae and charts. And there are extensive annotated bibliographical references to take you even deeper into each subject if you feel so inclined. In most cases, there is more than enough information to enable you to design practical devices of your own.

A few moans. I would have liked to see more about the politics of the present, centralised, non-renewable energy systems, and about the political implications of renewable, decentralised energy sources, and how we get from here to there. I know that the *Energy Primer* is meant to be a book about technology, not not the politics of technology. But there are only two pages out of 200 devoted to these wider issues. I agree that the book should be mainly technical rather than political, but I would have been happier if the ratio of technology to politics had been, say, five to one, instead of about 100 to one.

Also, I found one section of the otherwise-excellent article on Home Heating with Wood a little misleading. The author, Dennis Dahlin, gives a rough-and-ready method for calculating the amount of heat in BTUs required to heat a house of given floor area in a given climate (Page 155). He then quotes the amount of 'available heat' in BTUs obtainable from a 'cord' (equivalent to 80 cubic feet of solid wood) of timber and says that to find the total number of 'cords' needed to heat your home, you just need to divide the first figure by the second. But since the 'available heat' figures he quotes are for the *gross* calorific value of the fuel, this method makes no allowance for the inefficiency of the stove in which the wood is being burned. At best, with a totally-enclosed, well-designed stove, you can get 75 to 80% of the gross calorific value out in the form of useful heat. At worst, with an open fireplace, you can get less than 20%. So you could end up needing between 30 and 500 per cent more wood than you might bargain for if you used the formulae and figures given.



Again, in the article describing a 'Recycled Wind Generator', a low-cost design adapted from the old Paris-Dunn wind generators of the 30s and 40s, there seem to be a couple of misprints. The prop is described as being cut from 2in by 6in by 8 *inch* hardwood. Presumably they meant 8 *feet*.

Later on, a propellor described in the Lejay Propellor Manual is quoted as having a tip-speed ratio of only 3 or 4. This is the type of propellor used in the Undercurrents-LID wind generator, and ours certainly has a higher tip-speed ratio than that. And the description of how to re-wind a dynamo to work at low revs. is not detailed enough. In general, the 'Recycled Wind Generator' design looks a bit suspicious. I bet they haven't actually built one. Although there are plenty of detailed drawings and dimensions and so on, the only *photographs* are of an old commercially-built Paris-Dunn machine, not its amateur-built equivalent.

But don't let these minor criticisms give you the wrong idea: the *Energy Primer* is a great book. It gathers together a vast multitude of strands of information about renewable energy, information which would take you years of digging around in reference libraries to compile yourself, and presents them in a way that is satisfactory to the technically-minded, but not so technical as to put everyone else off. **Godfrey Boyle**

Branch Line Axed

Forest Energy and Economic Development, D.E. Earl. 128pp. Clarendon Press, 1975. £5; *Should Trees Have Standing; Towards legal rights for natural objects*, Christopher D. Stone. 102 pp. Los Altos, California, 1974; distributed in UK by Omnibus Book Service. £1; and *A Field Guide to the Trees of Britain and Northern Europe*, Alan Mitchell. 415pp. Collins, 1974. £3.50.

Trees, as Brian Ford and Ian Hogan point out (*Undercurrents* 10), are the ultimate solar collectors, capable of *catching* as well as *storing* solar energy. That capability alone can make any solar engineer green with envy. While he's busy trying to make devices that can store energy for a few months a tree can do it for decades or even centuries, increasing (rather than depleting) the store of energy all the time. And tree energy is virtually pollution free. Trees provide firewood, shelter, furniture, wood for carving as well as fruit and nuts. Trees have been people's best friends for the last three million years and yet to us they are strangers. Can you *name* the tree outside your window? Is it still there or have they cut it down?

No wonder trees are strangers to us if there are so few of them around. Britain has become one of the most treeless countries in Europe. What is being done about it? They've started growing paper forests. In this age of wheat prairies it is not surprising that today's forests are conifer monocultures. Scotland and Wales are now full of them. They do look pretty from a distance, but when you go into them they look like an army parade: all wearing the same camouflage, standing terribly straight. And there is little other life to be found in conifer plantations.

J. Pelisek (*Ecologist*, November 1975) points out the detrimental effects of conifer plantations, based on research done mainly in Eastern Europe. Soil deterioration is the main problem. Spruce trees, in particular, retain 30-40% of the rain that falls on them, compared with an average of 20% for broadleaf trees. In spruce monocultures this leads to low moisture levels in the soil, while, at the same time, the moisture retention capacity of the soil is reduced. One recent study has revealed that the soil of conifer monocultures also shows increased acidity, a reduction in the humus layer and overall compaction of the soil. A reduction in readily soluble nutrients could be detected in the topsoil layers. Spruce monocultures are planted for a quick return on capital invested, to the detriment of long-term fertility of the soil in which they are planted. And this is mainly the result of their lack of diversity.

Monoculture forests are the result of the overriding concern with productivity. Purely economic considerations are also responsible for the attitudes of some of those who advocate forests as a significant future energy source. *Forest Energy and Economic Development* is a scholarly example of this approach. He looks at the world's forests mainly for the firewood they yield. He points out that even though 90% of the world's energy consumption is derived from *non*-renewable fuels, most developing countries still rely on *renewable* sources, mainly wood, as their main sources of energy. He also points out that with the depletion of fossil fuels progressing rapidly, forest energy will gain in importance in the western countries in the years to come. Earl reckons that the forests of the world are physically capable of producing and sustaining supplies of fuel well above the basic energy needs of mankind. He reckons that countries with plenty of forests will have an advantage in times of energy shortage. "The prospect of a world shortage of energy resources offers an opportunity for those countries with ample forests to take up the chance to develop the comparative advantage now chiefly enjoyed by those with plentiful fossil fuel reserves."

Earl's book is mainly concerned with forestry in countries where wood and charcoal are still the main fuel. It indicates ways of planning this resource while considering problems like soil erosion in Nepal, where the felling of forests mainly for firewood has had dreadful consequences. The book contains some very useful statistics on world energy consumption and on wood as a fuel source. (Britain has just about the lowest fuel wood consumption of any country in the world.) Even though Earl points out that wood energy is really solar energy he does not make an attempt to show ways in which wood energy could be combined with other solar energy sources (collectors/windmills/tidal power etc.) as the energy base for a future stabilised economy. I suppose I'm expecting too much, but a book which is concerned with future energy options could at least indicate that the various natural energy sources open to us must be looked at jointly rather than in isolation from each other.

Could tree-farming be the answer to world food problems? This is the name of a short paper circulated by John Wood at Comtek 74. It is worth mentioning in this context. It points out amongst other things that in the middle ages farmers of western Europe used to herd livestock into deciduous forests where the animals could feed on seeds, nuts and berries from the trees. A practice far removed from today's farming methods, and only possible in the mixed forests long gone from most of Europe. Wood stresses the enormous potential of trees as producers of human and animal food. ". . . one harvest from a single mature Portuguese oak has been shown to equal the output from a whole acre of maize – 1200 litres of acorns!" Only 8% of the world's land surface is suitable for efficient cereal farming. Much more is suitable for forests. "In an intensive forest system, many spinoffs would result from agricultural processes. Subsidiary crops such as timber, honey, milk, chemicals, wool and wild game are all benefits from a well-run tree-farm economy." And, of course fruit, nuts, berries, mushrooms, etc. (Wood's paper will be reprinted in our forthcoming book *Radical Technology*.)

So far I have mentioned a number of economic and ecological approaches to trees and forests. There are other approaches, amongst them the legal approach, as put forward in Stone's book. Stone argues that trees and other natural objects should and could be protected by law in the same way as a person or organisation can. "I am quite seriously proposing that we give legal rights to forests, oceans, rivers and so-called 'natural objects' in the environment – indeed, to the natural environment as a whole." (p.9) "It is not inevitable, nor is it wise, that natural objects should have no right to seek redress on their behalf. It is no answer to say that streams and forests cannot have standing because streams and forests cannot speak. Corporations cannot speak either; nor can states, estates, infants, incompetents, municipalities or universities. Lawyers speak for them, as they customarily do for the ordinary citizen with legal problems . . ." (p.17) Stone proposes a legal framework in which natural objects or environments can have *guardians* who can claim redress for injuries inflicted on their client. The polluter, for example, should not only pay for damage done to a community of human beings but also for the full repair of a damaged natural environment. If a stream is polluted not only should the water be cleaned up but the fish stock should be fully restored . . . on the basis of a legal claim *on behalf* of the stream. An interesting thought; but back to the trees!

A Field Guide to the Trees of Britain and Northern Europe is a good general guide to trees – a very good book for getting to know the tree strangers a little bit on their own paper. Or go and visit an equatorial rain forest where you may still find 800 different species of tree on a couple of acres, and plenty more in some places.

Herbert Girardet

Numbers Game

Destiny Mars, M W Saunders. 64pp. Downs Books, Caterham, Surrey. £1.
Lost Art of Mathematical Exploration, by F Crook. 36pp. Published by the author at Grange Place, Guernsey, C.I., British Isles. £2.50.

Strange geometrical and numerical relationships, such as those of ley lines or the Great Pyramid, have been an ingredient of many successful and popular books. Most publishers require that a book in this vein should have as its other ingredient enough romance, fantasy and curious lore to intrigue even the innumerate. Authors who do not wish to embellish their mathematics with more poetic material, and who cannot write to publishers on university notepaper, will probably have to publish their numerical discoveries privately. I have been reading the work of two who have recently done so.

The easier of the two books is the 64-page *Destiny Mars*. Its whole argument is based on a single surprising coincidence, though other evidence is brought in as the argument proceeds. We start with the observation that the Great Pyramid in Egypt, and the Pyramid of the Sun in Mexico, can be seen as pointers to an orbit 20,800 kilometres above the equator. The same orbit is indicated by two quite different methods, one involving both pyramids. We infer that if we have a good look for things flying round the earth at about that height, we may learn something to our advantage.

Quite rightly, M W Saunders points out that chance coincidences can and do occur. It may be that there is nothing to explain. But if an explanation is needed, I think it will have to be quite an imaginative one. The theory offered by Saunders is persuasive, and develops quite logically once you make the giant leap of supposing that the two pyramids were built by visitors from space. Thus whatever other functions they had, the pyramids were also intended as durable signposts to some kind of time capsule, which mankind is intended to discover at the dawn of the space age, i.e. about now! SF writers have speculated often enough about the possible contents of such a capsule, and Saunders plumps rather unadventurously for an information capsule which will tell us how to avoid ecological disaster, nuclear war, or some other untimely end.

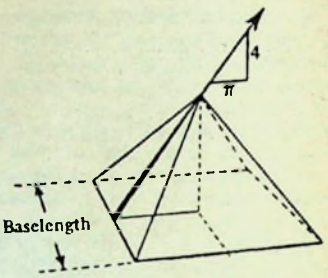
At this point in the argument, Saunders put his ideas to Duncan Lunan, who has proposed his own theories about alien earth satellites (long-standing *Undercurrents* subscribers see *Eddies* No.5, February 1973.) Lunan got out his calculator and astronomical tables, and spotted that two revolutions of the hypothetical satellite are almost exactly equal to one Martian day. Other mathematical relationships soon emerged, linking the earth, Mars and its satellites, the pyramids and the hypothetical earth satellite. In the final version of the theory, the information capsule is at a site on Mars, and the hypothetical satellite becomes a mere 'intellectual signpost', which might have been there but actually is not. Alternatively, the capsule might be on Mars's satellite Phobos or on Jupiter's fifth satellite. Some day, I suppose, these predictions may be tested – unless the threatened disaster overtakes us first.

Destiny Mars is not a cranky book. Saunders and Lunan seem very aware of the pitfalls of their theory, and I don't suspect them of fiddling their figures, even unconsciously. It is a little surprising to find an appendix entitled *Evolution of God*, but it turns out to be innocuous. There is no attempt to use metaphysics to patch up gaps in the physics. The ideas presented in the appendix, like those in the main text, would have been unremarkable in a work of science fiction. Indeed Arthur Clarke has almost done it already, his 'time capsule' story being *The Sands of Mars*, and his appendix on the evolution of the Cosmic Spirit being *Childhood's End*.

Frederick Crook's *Lost Art of Mathematical Exploration* is a much tougher book. It only runs to 36 pages but the style is dense, almost shorthand. Many years of work must be condensed into these chiselled phrases. What Crook proposes is the reinstatement of an old but forgotten form of mathematical science. This science does not predict, nor does it provide models and analogies. Its only resemblance to our familiar science is that it reveals mathematical relationships between observed quantities. But the relationships it finds trample roughshod over our ordinary ideas of cause and effect. For example links are found between fundamental constants, the periodic table of chemistry, and the physical constants of the solar system. The relationships have a certain pattern about them, but they do not correspond to any physical intuition. A link may be found between the periodic table of chemistry, and the orbits of the planets. The conventional scientist, faced with this, might suggest the explanation that atoms are little solar systems. But such an explanation would, I think, be distasteful to Crook. In any case the relationships he finds are *not* those which would emerge from an analogy between atoms and solar systems. Their pattern is – to the conventional scientist – infuriatingly arbitrary, since it corresponds to nothing that can be modelled with billiard balls or bits of elastic.

And yet, isn't it one of the claims of conventional science that the ultimate arbiter is always the cold equations – and that intuition, while sometimes valuable, can equally be misleading? True followers of Descartes, who believe that ultimately everything is mathematics, should really have no argument with Crook and his porisms. Crook's equations *work*, usually with one part in a million accuracy. This is profoundly disturbing, since one cannot say why they should. But it is also healthy, since it made me, as a 'conventional' scientist, wonder once again why *my* equations work. When scientists make mathematical 'models' they approximate knowingly. The model is not the real physical system. The system itself is usually infinitely more mysterious, and the scientist deliberately pushes the mystery to one side, hoping that the model he now has will be adequate for the limited task in hand; but he knows that later, other scientists will return and build new models which shut the mystery still further out in the wilderness.

Nothing Crook says challenges the actual numbers of conventional physics. Only its underlying philosophy is



threatened. One could say that Crook has established a new network of connexions between the physical constants, adding to the connexions already established and 'theoretically justified' by conventional science. But what does this new network *mean*? The laziest interpretation is to say that God built these relationships into the universe because He liked them. A different version would say that the relationships are coincidental, and that coincidences happen and that is that – this argument should appeal to those students of Jung and Koestler who always point out that three improbable things have happened to them before breakfast. Finally, there is the 'conspiracy' theory. This says that the whole thing is an artefact, a deception like a 'think-of-a-number' trick. Obviously what Crook has done is to take enough constants, several dozen of them in fact, to be able to get tolerably close to any desired result by adding, multiplying and exponentiating a few carefully chosen members of the list. I hope I can encourage someone to look at Crook's figures – and indeed at those of Saunders – from this critical point of view. I myself have not done so – it would take months – so I will not state dogmatically that the whole thing is deception or self-deception. Certainly my suspicions are aroused by the large number of constants Crook uses to make the equations come out right. But I can give no substance to this hunch, having only checked a few calculations at random to eliminate crude arithmetical fraud.

Even if *Lost Art* does turn out to be a monstrous, and brilliant, deception, reading it can still do the conventional scientist a lot of good by making him confront his glib Cartesian assumptions about the relationship of mathematics to science.

Tony Durham

Solar Anarchy

Living on the Sun, Godfrey Boyle. 127pp. Calder and Boyars. £1.95 paperback, £4.50 hardback.

This is definitely not a book for those who think that Tony Benn is a dangerous Marxist. A book which advocates the adoption of alternative energy "not in the hope that such a step will somehow insure us against the possible collapse of 20th Century technocracy, but as a revolutionary act that will help to hasten the collapse of that technocracy", is written for the politically converted, not for those who expect capitalism to come out unscathed on the other side of the Blueprint for Survival. For the already convinced eco-freak, who knows that windmills and political change go together, it is a book that would have been very valuable four years ago. However, the way that the material is presented, even though much of it has been well aired in other books, should make it of interest to the radical Left. The publishers, Calder and Boyars, have also produced books on the 'brainwashing techniques of the mass media', 'the position of working class children in a middle class educational system', 'an examination of the crises that democratic capitalist societies are now facing', and similar topics in the same series as 'Living on the Sun'. Appearing in this context it is to be hoped that this book will be read by those Leftists who have never thought about the energy/resources argument, or who think that AT is a bourgeois red herring in the class struggle, or who think that after the Revolution Concorde and the motorway construction programme will carry on with business as usual under workers' control. Godfrey Boyle places AT in its political and social context, and if this makes some of the politically active think more deeply about the relation between the current organisation of society and current energy supply and use patterns, then a chance may have been formed for AT to play a serious role in the deliberations of those who would change society. Without such a role AT could remain considered as a harmless amusement, irrelevant to any real needs, indulged in by middle class intellectuals with time on their hands. In fact no new arrangement for society will work unless it can produce energy and food in a world of increasing scarcities, and no revolution that has the greater happiness of humanity (as opposed to the simple seizure of power) as its aim can seriously contemplate the continuing use of centralised energy supply and mass production agriculture with the centralised control and alienation that go with them.

Godfrey Boyle goes into the reduction of energy demands in the domestic sector with a series of reasonably accurate 'guesstimates' of possible reductions, and then discusses in further chapters how alternative energy sources can be used to meet these demands. The familiar (to regular Undercurrents readers) topics of sun, wind, water and bio fuels are discussed in enough detail to be convincing but not at such length as to put off those not interested in the technology per se. One might complain that the rough estimates used in these descriptions of available techniques and the costings of DIY devices are not sufficiently precise or documented, but they are of the correct order of magnitude and probably enough to make the point to the unconvinced. Sadly there is a confusion in a footnote over wet and dry weight which fails to make the humble but unattractive sugar beet into the wonder fuel of the future; however, the point that beet type crops grow a good deal of bio mass in a small space still stands. The final chapter is of considerable interest as it attempts to meet a reduced energy budget in all sectors – industry, transport, domestic, agriculture etc. – from ambient sources, and suggests that this could be achieved. The chapter is full of guesses and vague estimates but provides a basis for argument and perhaps some further research. There is also a good bibliography which combines theoretical and practical reading with sources of supply for AT machinery of various sorts.

All in all a good read for those who need converting, and the colour of the jacket will match *The Autonomous House* on your bookshelf. Let's hope someone buys Benn a copy before he irradiates us all.

Brenda and Robert Vale

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ETCETERA

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Heat Pumps / Alternative Electronics / Organic Living Experiment / DIY Windmill Design / Alternative Technology Sources Guide / Running Your Car on Gas / Small-Scale Water Power / What's Left of Alternative Technology? / Stan Gooch reviewed by Colin Wilson / Have Plants a Secret Life? . . . . . .

Undercurrents 7. Special Communications Issue

Telephone Tapping & Mail Opening: who does it & how / A Phone Phreak's Confessions / The Government's Doomsday Communications Systems / TV Cameras Spy on City Streets / The People's Radio ...mer / Switched-on Uses of Ham Radio & TV / Cable TV: What's in it for the Media Moguls / AT in the Shade / Did a Stray Missile Shoot Down an Airliner? . . . . . .

Undercurrents 8

Prince Philip Visits National AT Centre / Eddies' Paranoia Corner / COMTEK Festival Report & Pictures / BRAD Community / Organic Living Experiment / Sward Gardening Introduction / The Other London Underground Radio: Opening Up the Air Waves / Building with Rammed Earth / Multi-blade Windmill Design / Wind Generator Theory / Hermeticism: Technology Needs Transcendence / Plus: a look at *Undercurrents* finances . . . . . .

Undercurrents 9

Special Feature on Nuclear Power Dangers. Kiddies' Guide to Nuclear ... / ... Disposal Dangers / The Breeder – Fast & Deadly / End ... US ...clear Dream / The International Protesters / Energy An... Power / Nuclear Proliferation Perils / The Terrorists' DIY A Bomb / ...anium Supply Shortages . . .
... Blackmail – has it already been tried? / Bunker ... / Solar Collectors : product review / Nature et ... in Paris: full report & photos / Hudson Institute ... Grown Food make a Significant Contribution?

Undercurrents 10

Joint Issue with Resurgence Magazine.
Solar Collectors: Complete Background Theory and low-cost DIY Design / Towards An Alternative Culture: Part 1 / Land for the People / New Villages Now / Sward Gardening in Practice / Anarchist Cities / General Systems / Future of Alternative Technology / Schumacher: A Conscious Culture of Poverty / Living the Revolution: Milovan Djilas / Industrial Slavery Can Now End / Nuclear Protest Builds up Steam . . . .

Undercurrents 11

Nuclear Nightmares Come True / Bee Keeping / Back to the Land : What happened in the '30s / Mysterious Energies: the Hidden Secrets of Ancient Britain / Building with Compressed Subsoil Blocks / Wind Power Special Feature: Background Theory & Part 1 of the *Undercurrents-LID* Wind Generator Design / New Methane Digester Design / The House That Jaap Built – an Autonomous Dome in Holland / Mind Expansion: An Evaluation of Psychocybernetics and Silva Mind Control / Getting Your Goat: Goat-keeping Demystified / Towards An Alternative Culture – part II . . . .

Undercurrents 12

AT and Lucas Aerospace / Comtek 75 / DIY Biofeedback / Alternative Medical Care / The Crabapple Community / Half Life against Nuclear Power / The Granada Tele-eco-house / Planning for War / The Brighton Envirofair / CEGB Energy down the Drain / Community Technology in Washington DC / Class War Comix / World Energy Strategies / Transcendental Meditation / Freedom for Scotland . . . . .

Undercurrents 13

Diggers Ancient and Modern / Energy and Food Production / Lucas' Alternatives / Planning / National Centre / Transcendental Meditation / Methane . . .

RADICAL TECHNOLOGY

THE LONG-AWAITED *Undercurrents* magnum opus, our book *Radical Technology*, was published in the United States at the end of January. In the UK and Australia it'll be available in April. Copies will be widely available in all good bookshops. You'll also be able to order copies from *Undercurrents*, after publication, at the cover price, £3.25, plus postage and packing. Here is Peter Harper's summary of the book, for lazy reviewers and prospective purchasers.

Radical Technology is a large-format, extensively illustrated collection of original articles concerning the reorganisation of technology along more humane, rational and ecologically sound lines. The many facets of such a reorganisation are reflected in the wide variety of contributions to the book. They cover both the 'hardware' – the machines and technical methods themselves – and the 'software' – the social and political structures, the way people relate to each other and to their environment, and how they feel about it all.

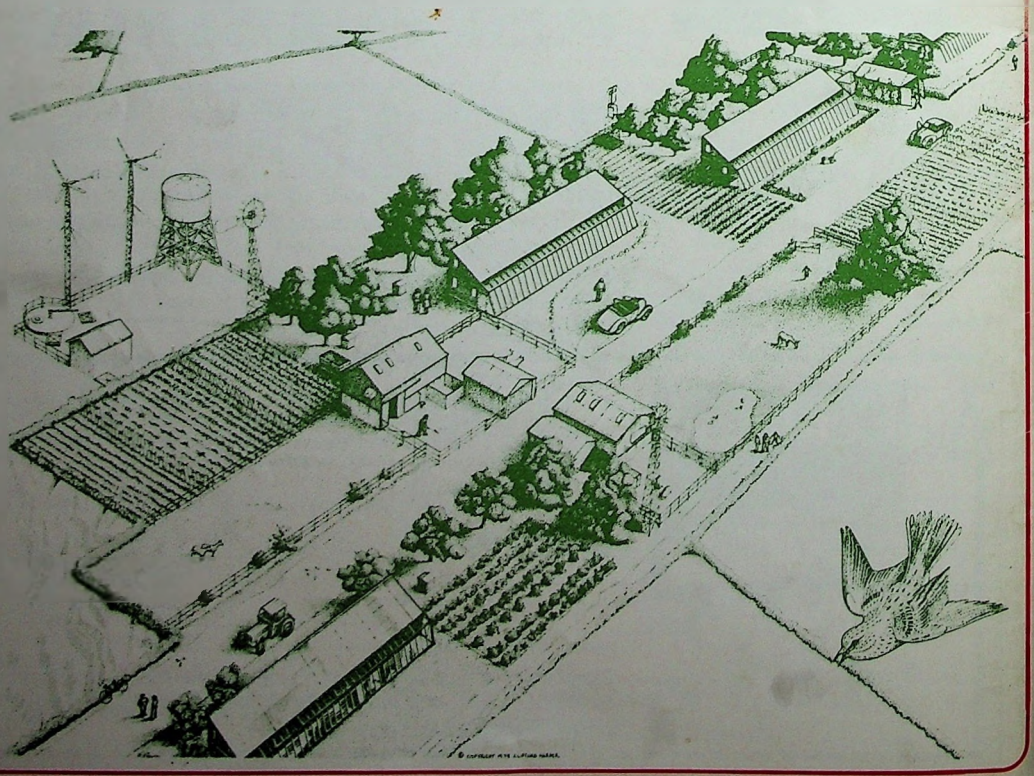
The articles in the book range from detailed 'recipes' through general accounts of alternative technical methods, to critiques of current practices, and general proposals for reorganisations. Each author has been encouraged to follow her or his own personal approach, sometimes descriptive, sometimes analytic, sometimes technical, sometimes political. The contributors are all authorities in their fields.

The book is divided into seven sections: Food, Energy, Shelter, Autonomy, Materials, Communication, Other Perspectives. Over forty separate articles include items on fish culture, small-scale water supply, biological energy sources, a definitive zoology of the windmill, self-help housing, building with subsoil, making car-tyre shoes, the economics of autonomous houses, what to look for in scrap yards, alternative radio networks, utopian communities, and technology in China. Between the main sections are interviews with prominent practitioners and theorists of Radical Technology, including John Todd of the New Alchemy Institute; Robert Jungk, author of *Humanity 2000*; the Street Farmers, a group of anarchist architects; Peter van Dresser; and Sietz Leefland, editor of *Small Earth*, the Dutch journal of alternative technology.

Also included between the main sections of the book is a series of visionary drawings by the gifted illustrator Clifford Harper, evoking the spirit and practice of Radical Technology: 'how it could be'. These drawings, or 'visions' include a communalised urban garden layout; a household basement workshop; a community workshop; a community media centre; a collectivised terrace of urban houses; and an autonomous rural housing estate.

The book ends with a comprehensive directory of the literature and active organisations in Radical Technology. This notes inevitable gaps in the book's coverage, points the reader to where more information can be found, and provides also an overall picture of a growing movement.

Radical Technology: Food and Shelter, Tools and Materials, Energy and Communications, Autonomy and Community. Edited by Godfrey Boyle and Peter Harper, and the editors of *Undercurrents*. Wildwood House, London; Pantheon Books, New York, 1976. 304pp, A4, illustrated, index. Hardback ISBN 0 7045 0218 6; paperback ISBN 0 7045 0159 7.



Vision No 1: Intended for rural or semi-rural areas. These dwellings would be independent of grid services. Some services (waste treatment, some food, space and water heating) would be provided at the household level, others (electricity, water, cooking gas, some food) at the community level, where economies of scale make shared facilities cheaper. The houses are based on Brenda Vale's 'Autonomous House' design.